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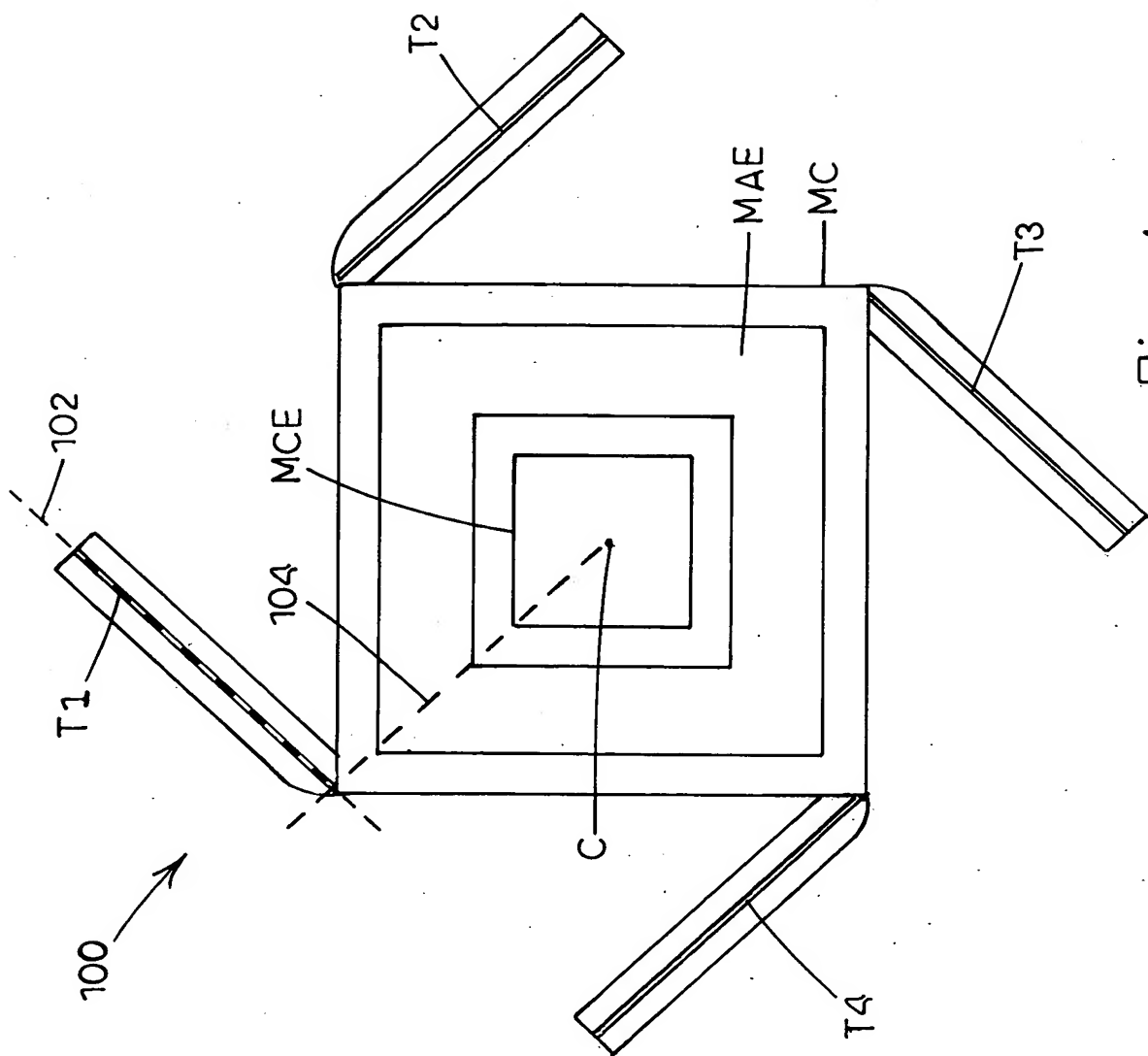


Fig. 1

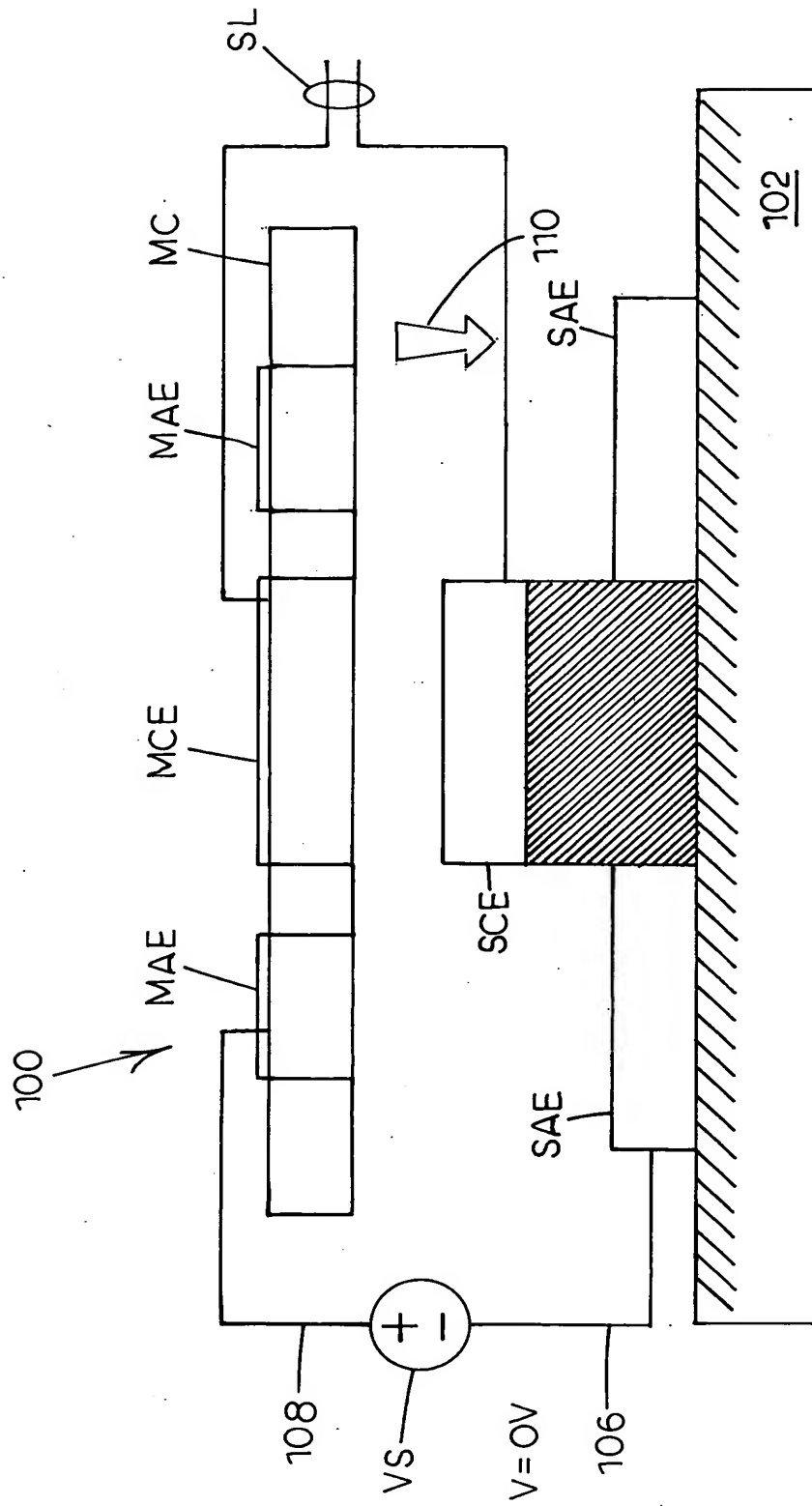


Fig. 2A

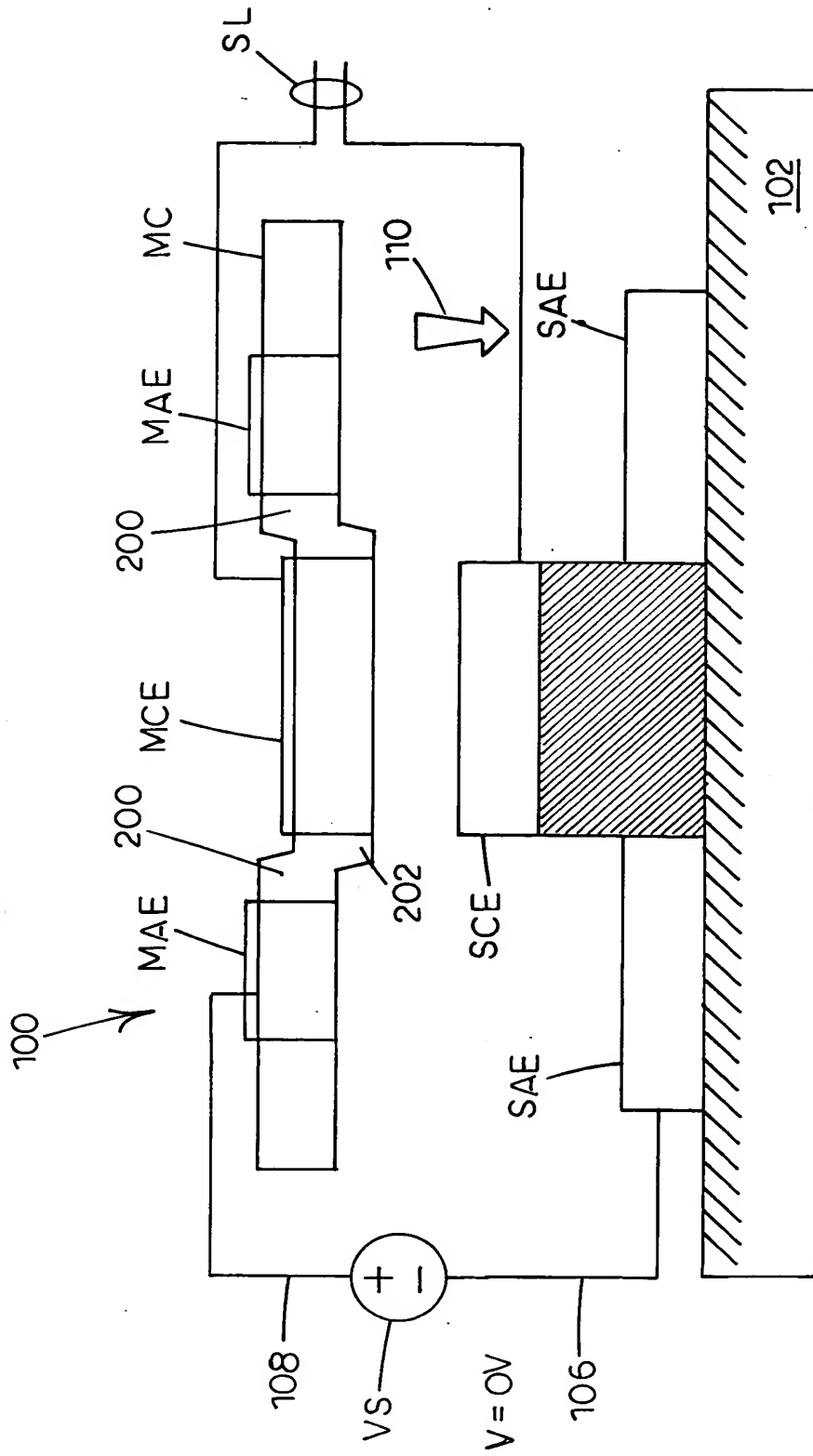


Fig. 2B

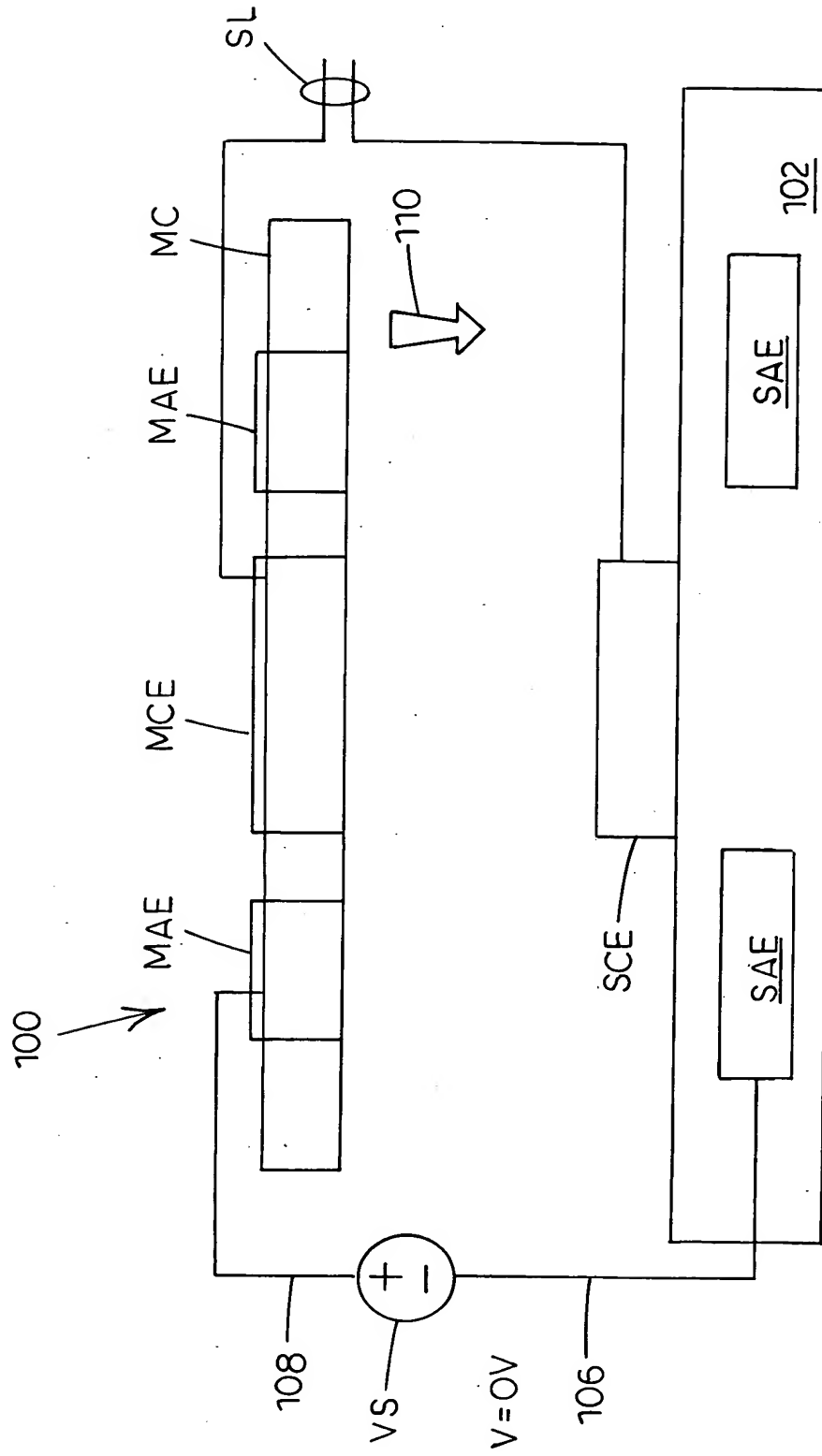


Fig. 2C

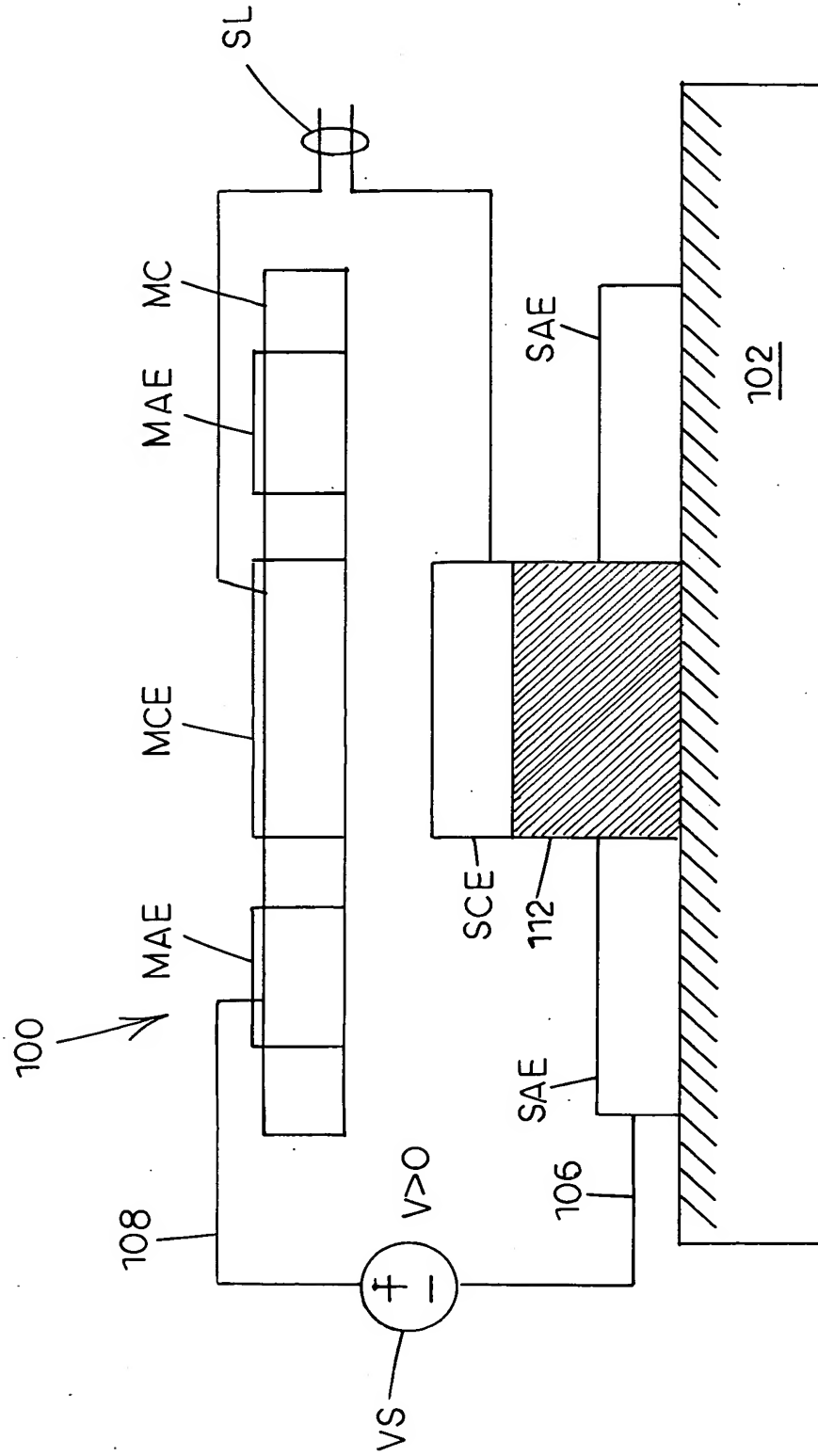


Fig. 3

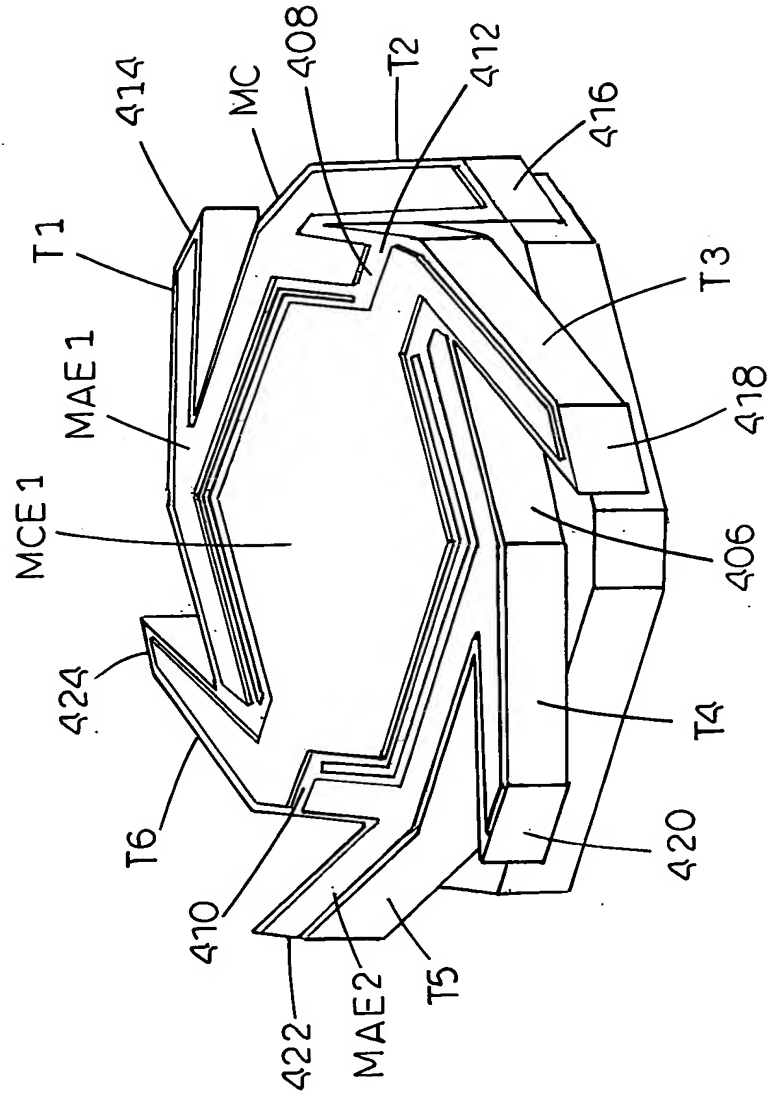


Fig. 4





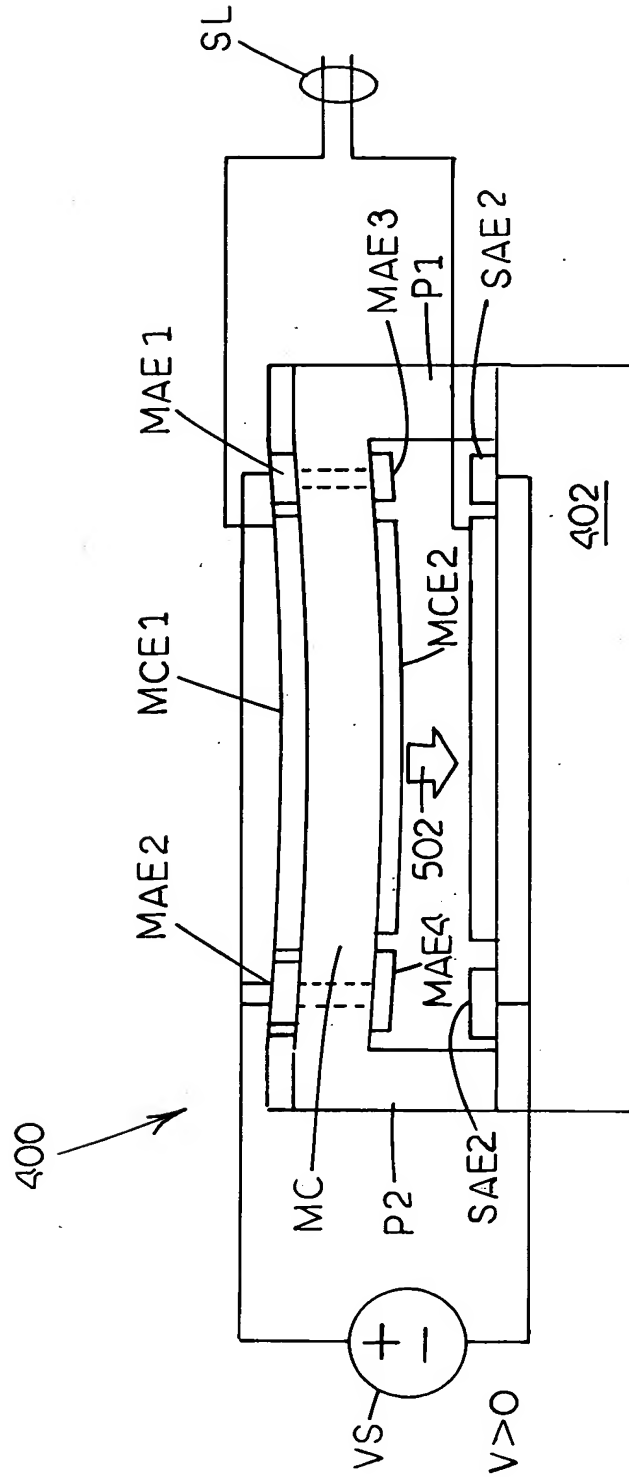
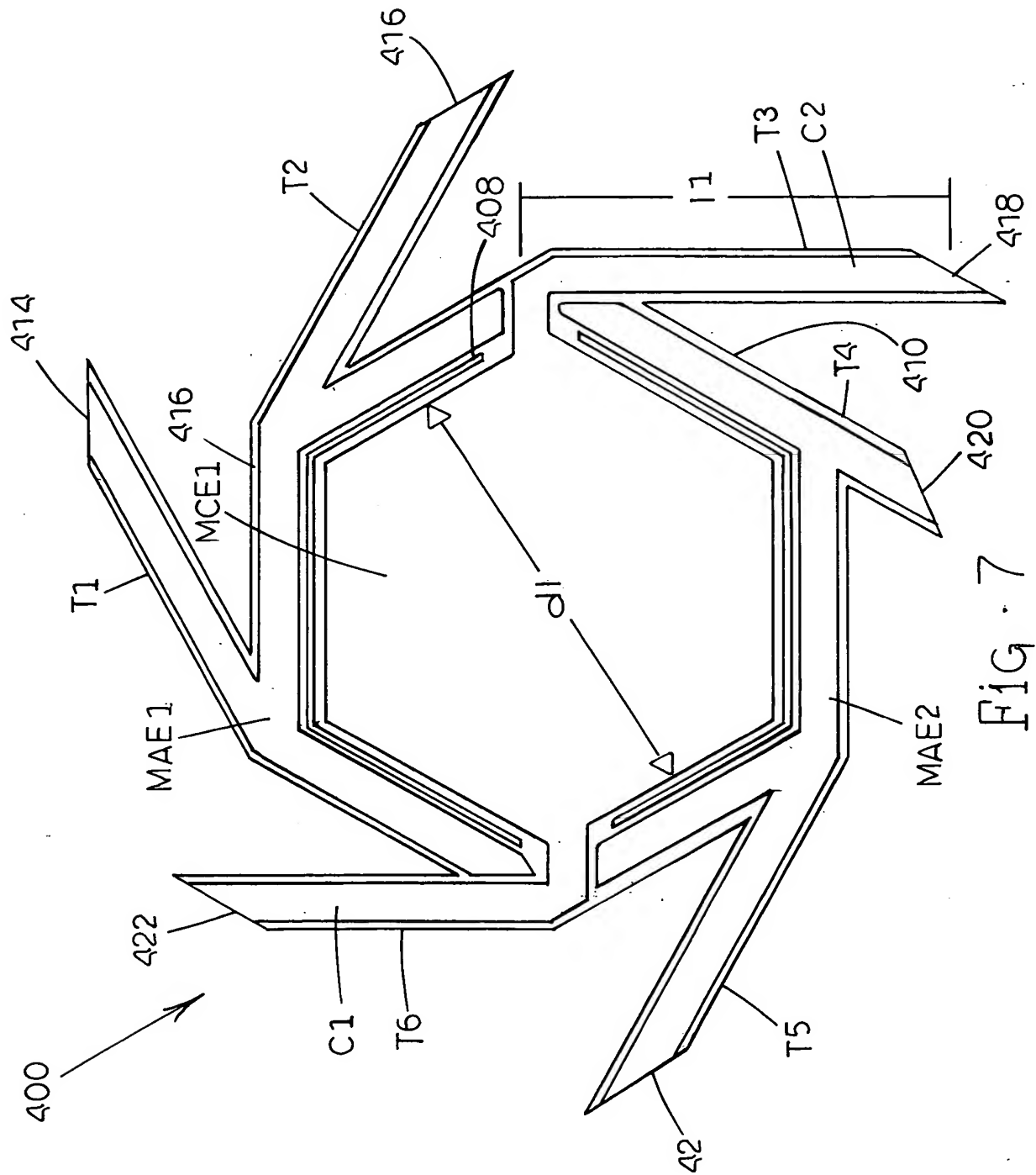


Fig. 6



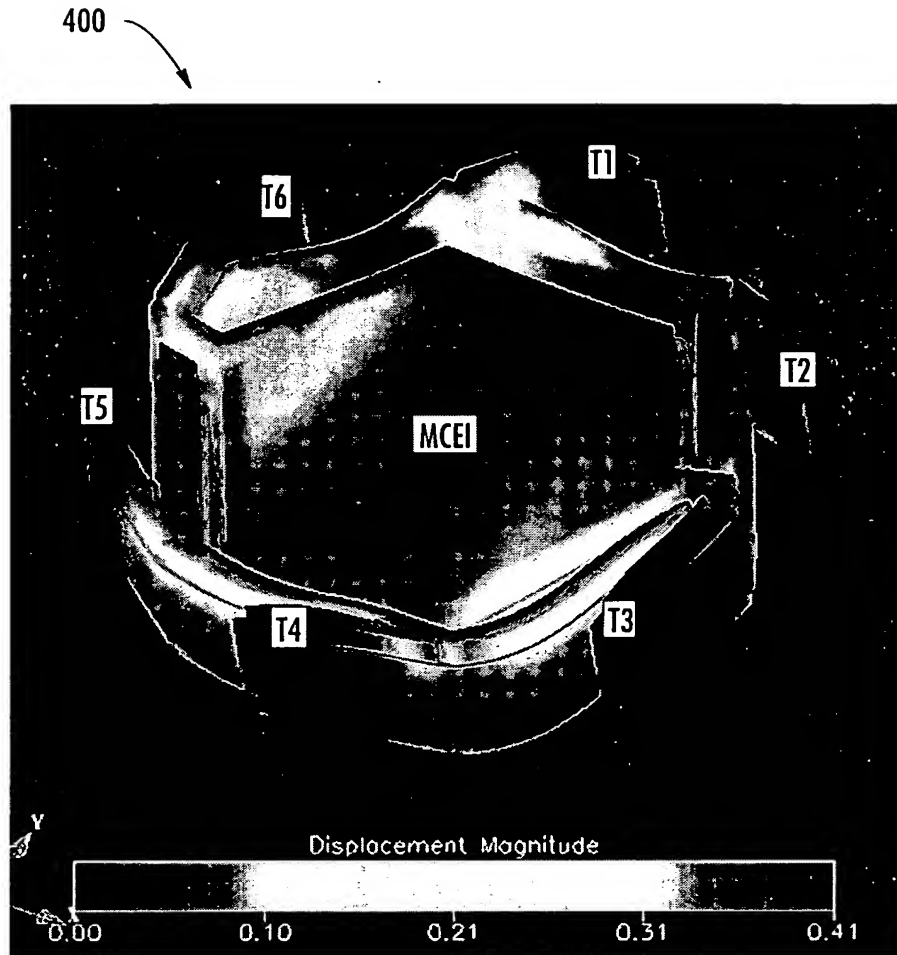
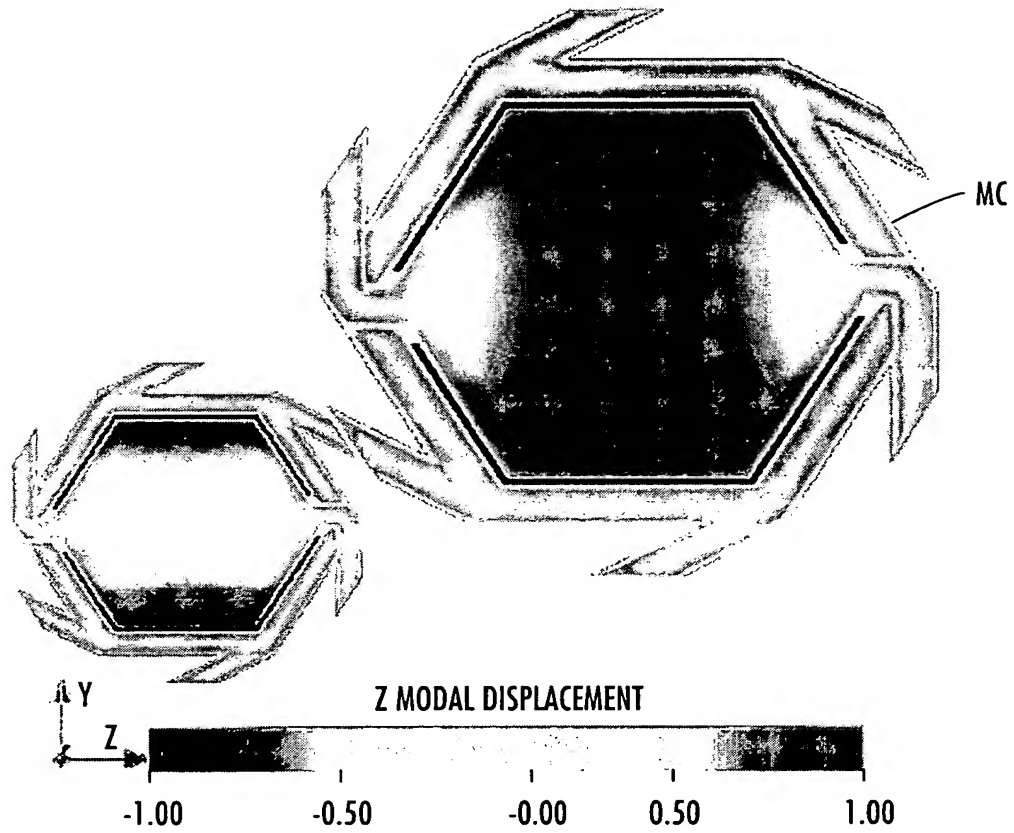


FIG. 8



**FIG. 9**

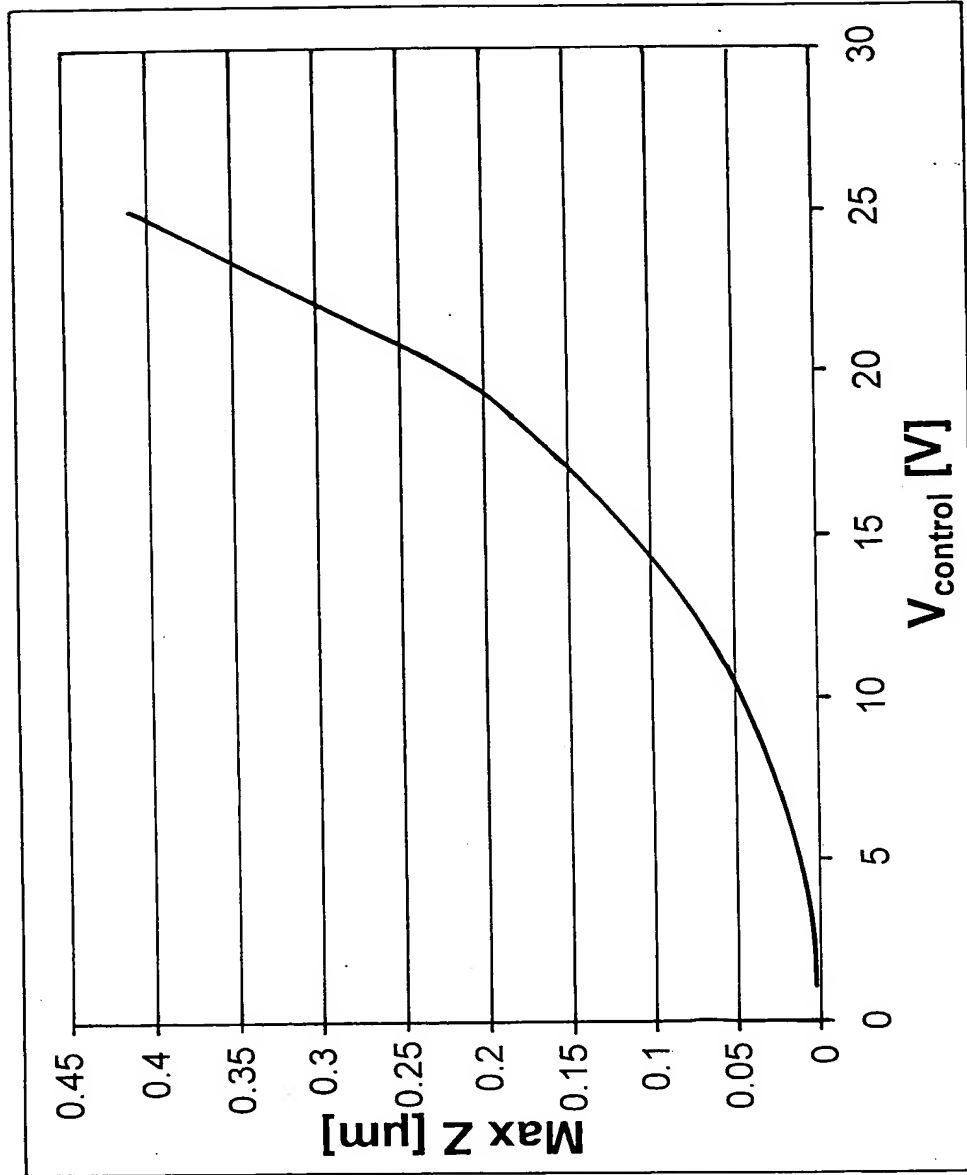


Fig. 10

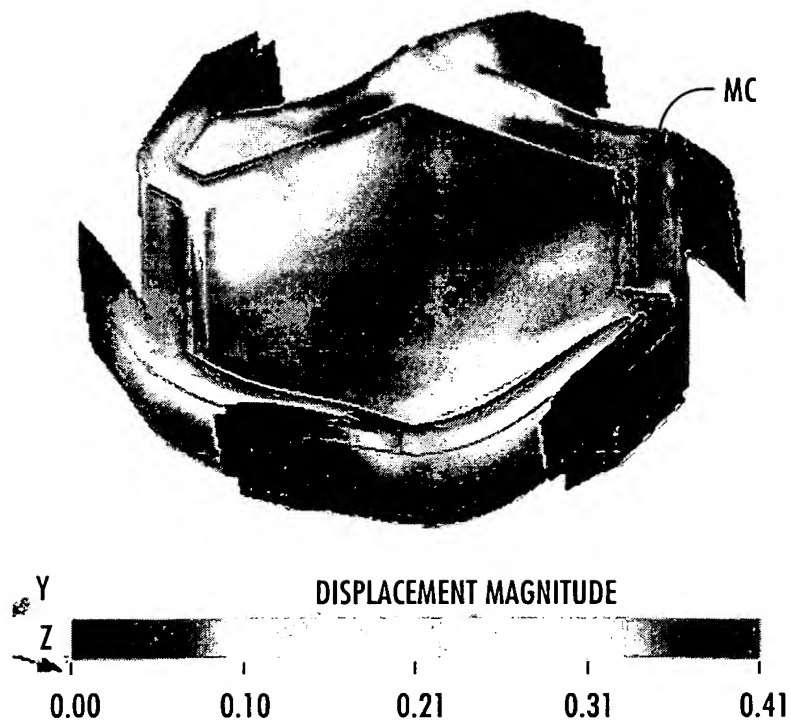


FIG. 11

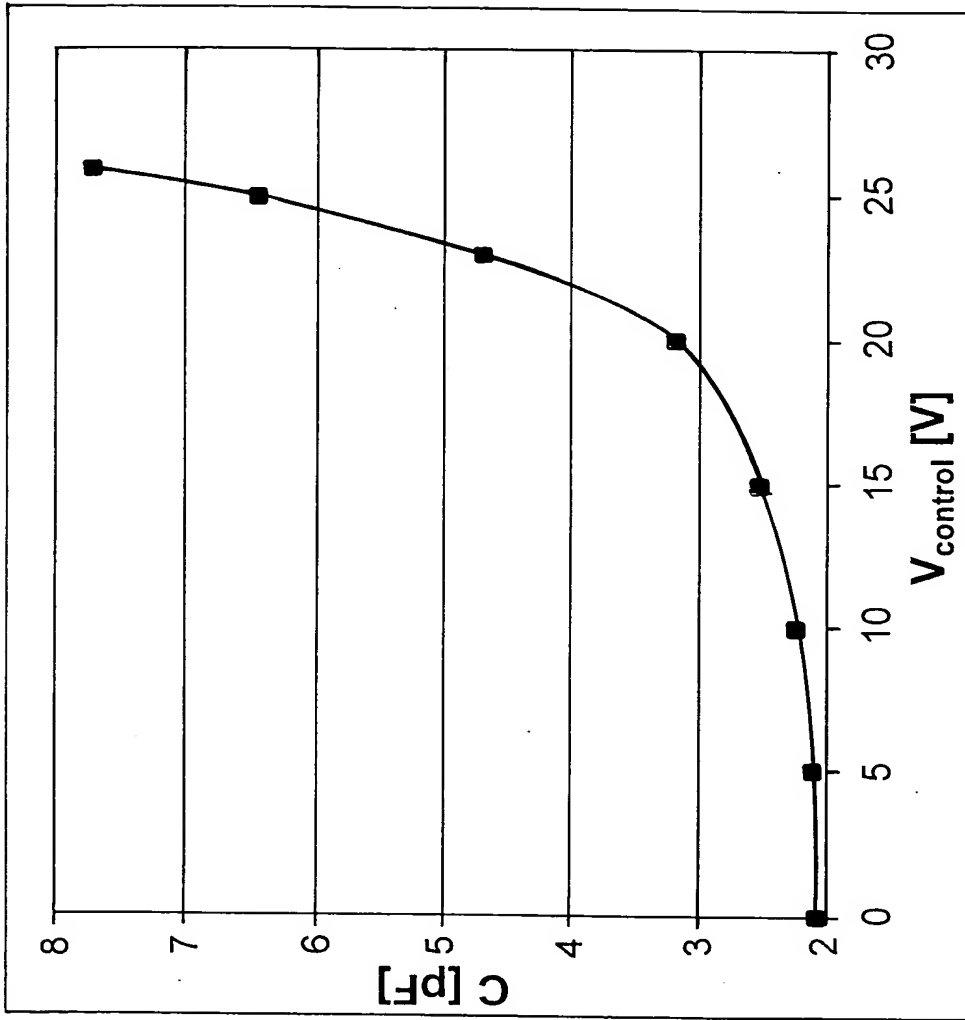
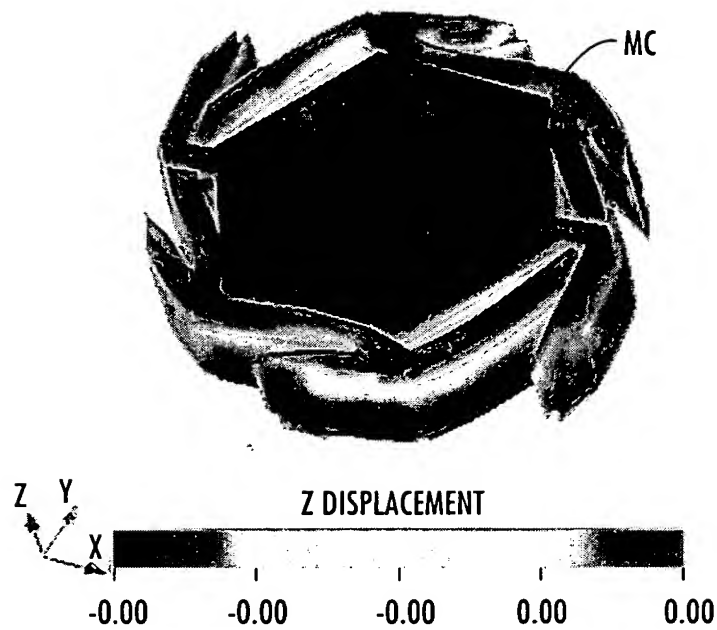
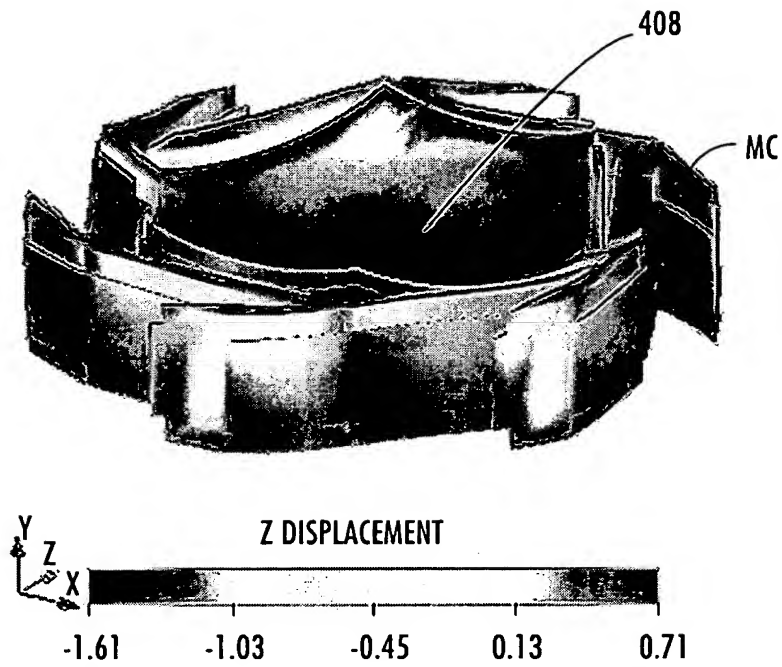


Fig. 12



**FIG. 13A**





**FIG. 13B**

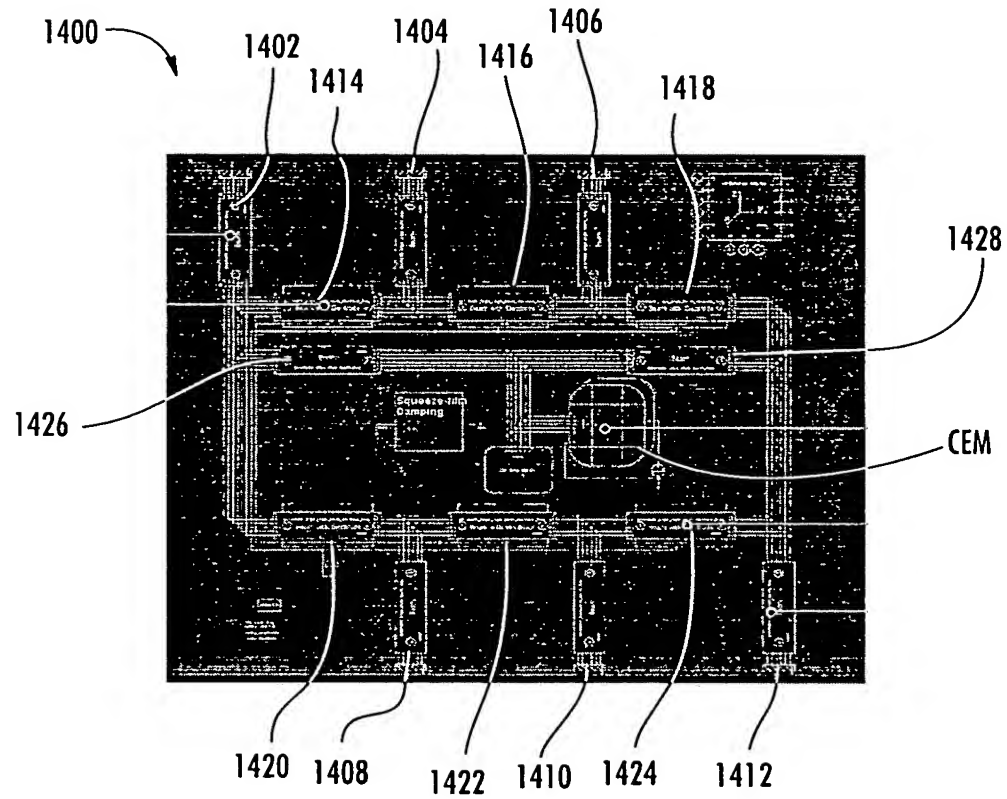
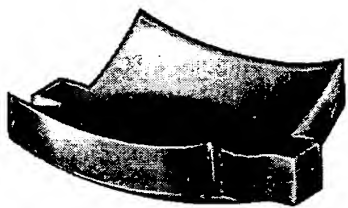
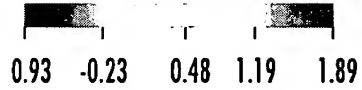


FIG. 14

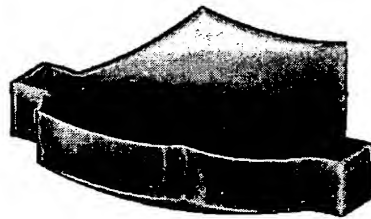
**FIG. 15A**



Z DISPLACEMENT



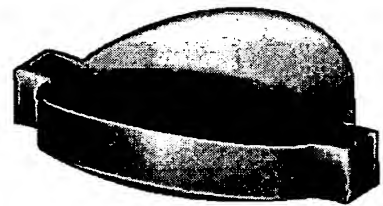
**FIG. 15B**



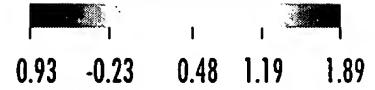
Z DISPLACEMENT

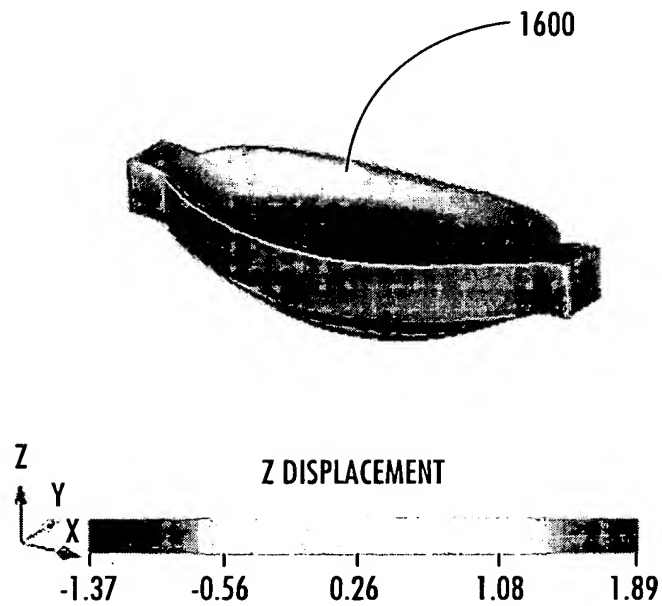


**FIG. 15C**



Z DISPLACEMENT





**FIG. 16**

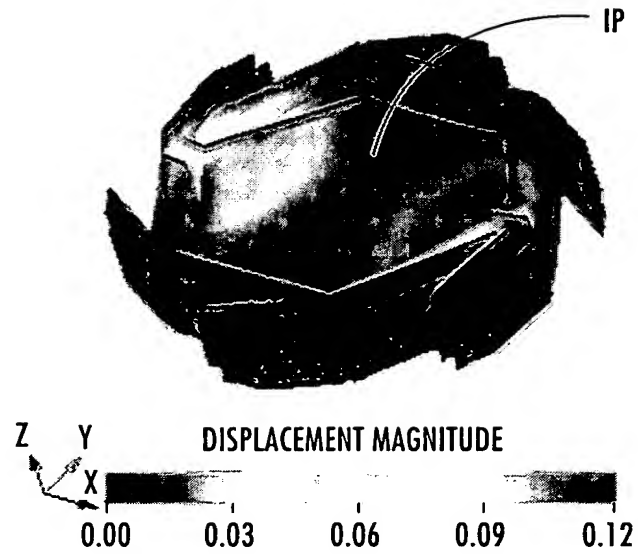


FIG. 17

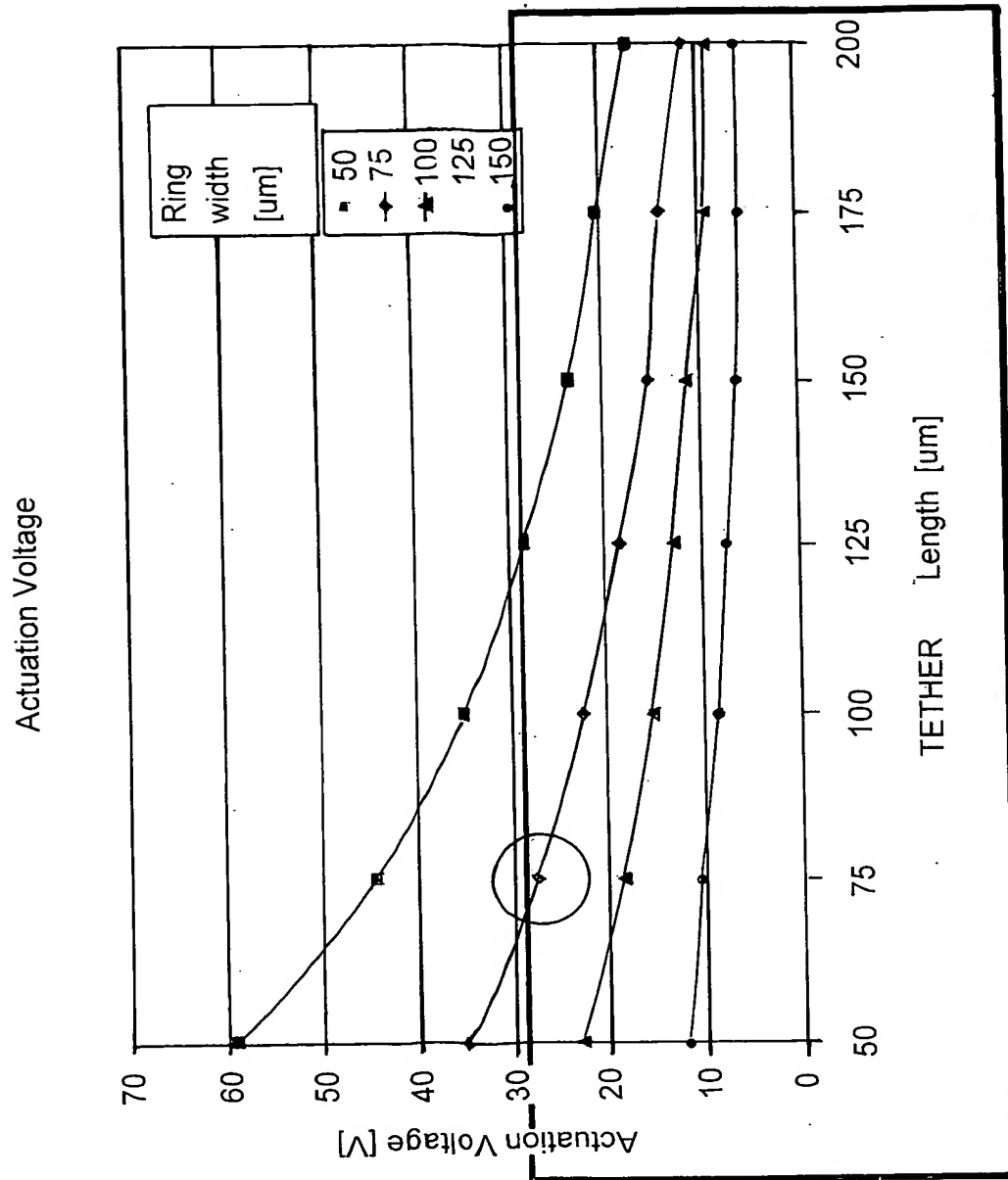


Fig. 18

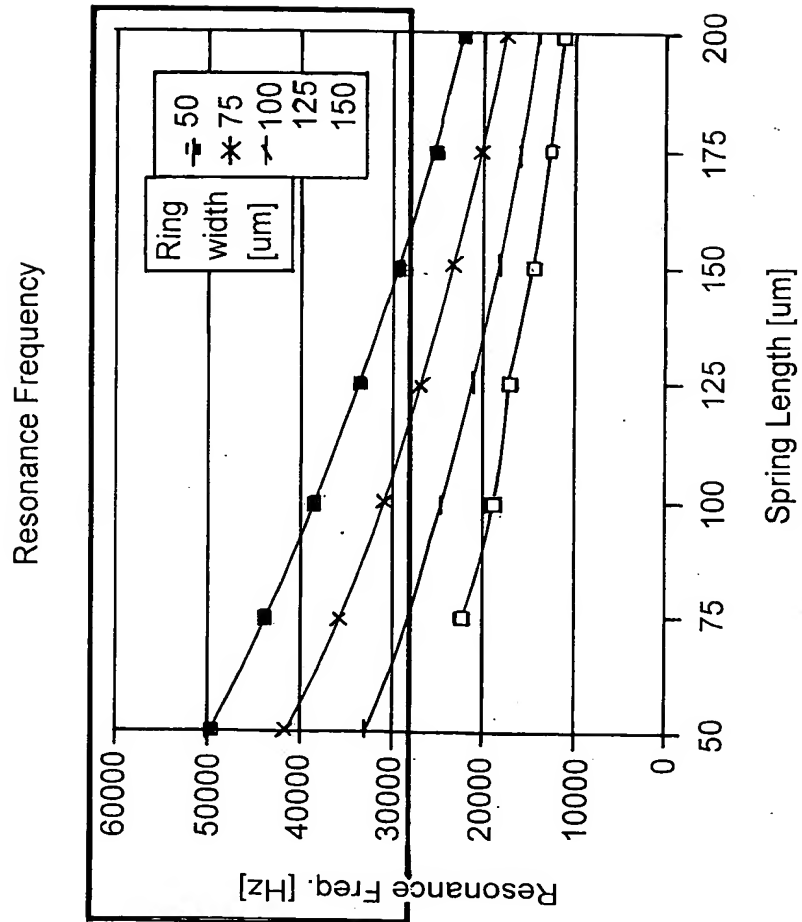
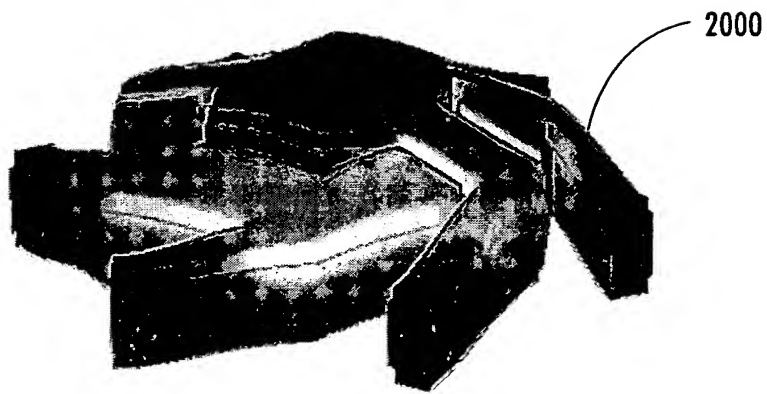
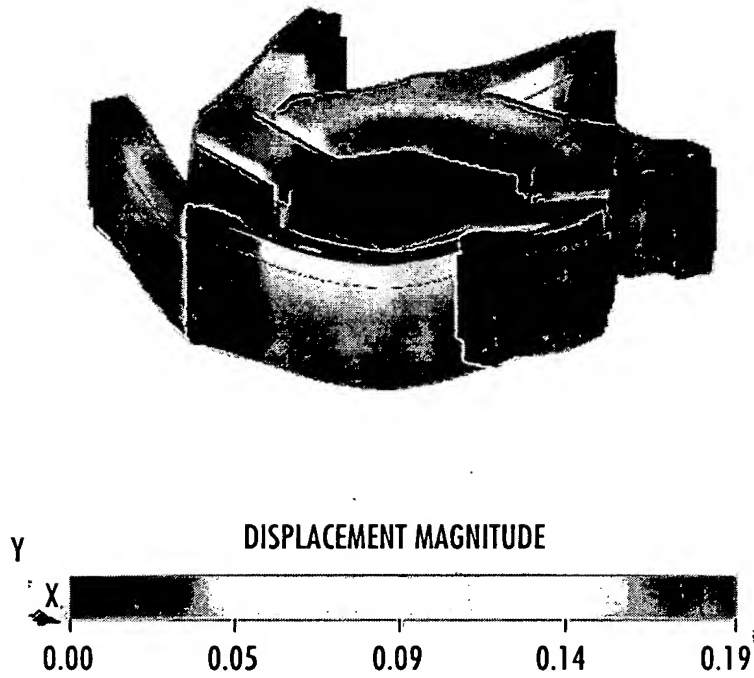


Fig. 19



**FIG. 20**





**FIG. 21**

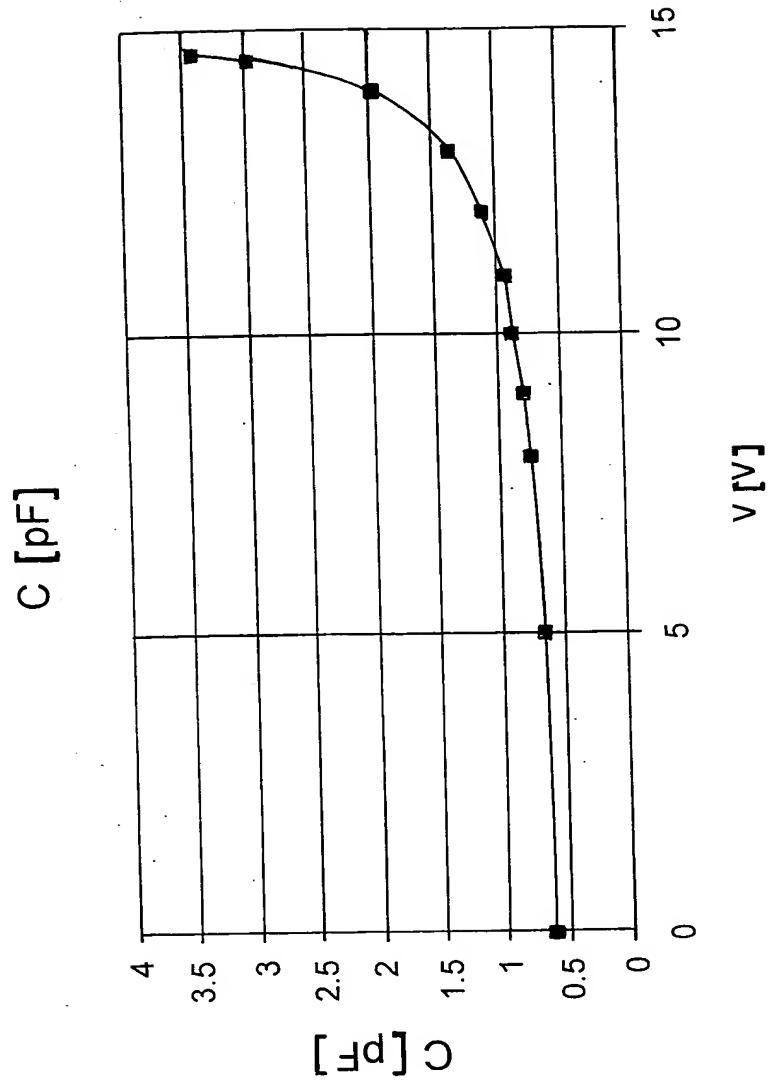
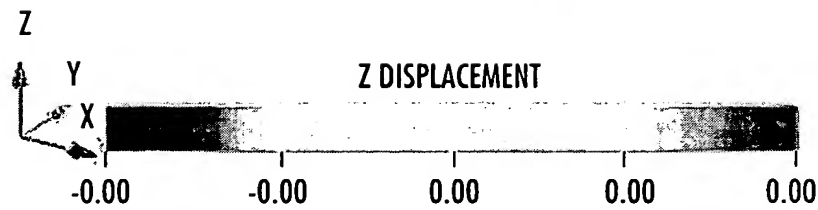
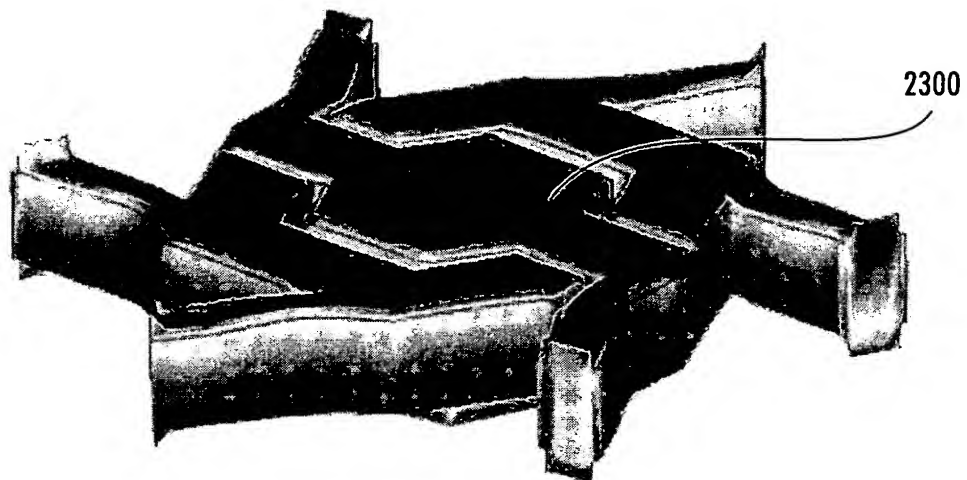
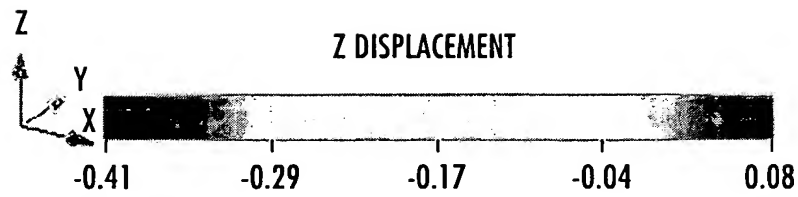
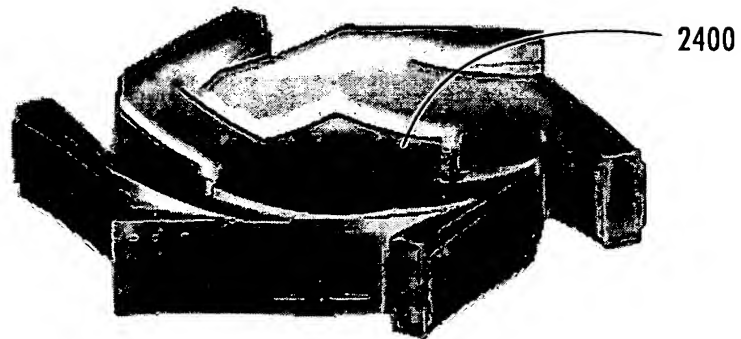


Fig. 22



**FIG. 23**



**FIG. 24**

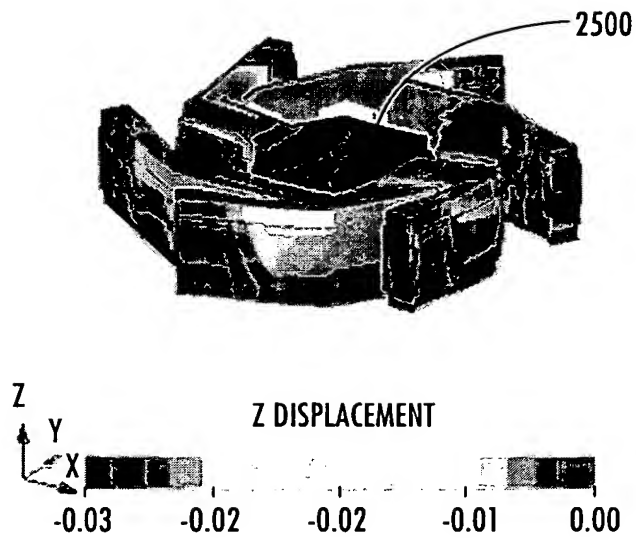


FIG. 25

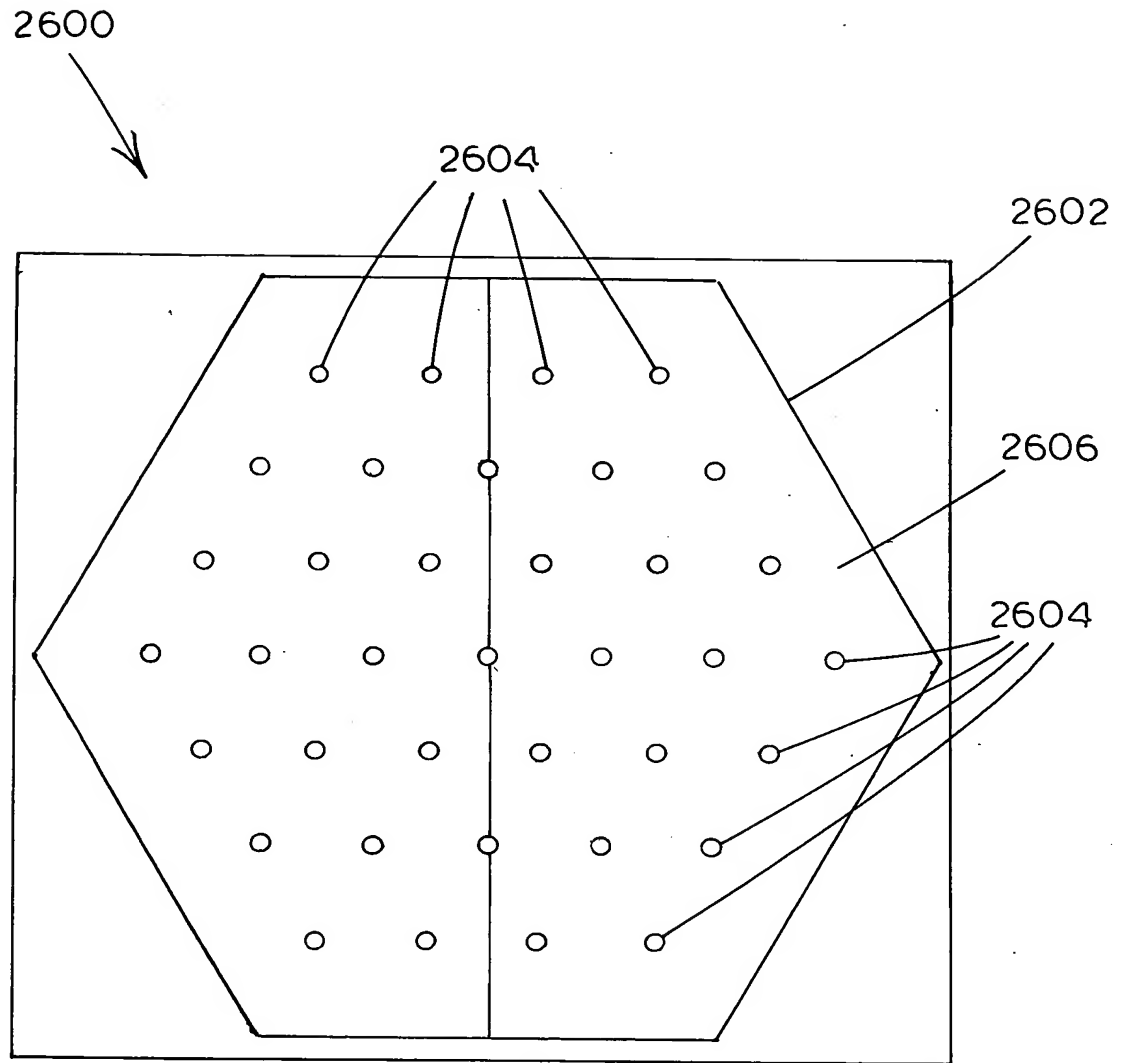


Fig. 26

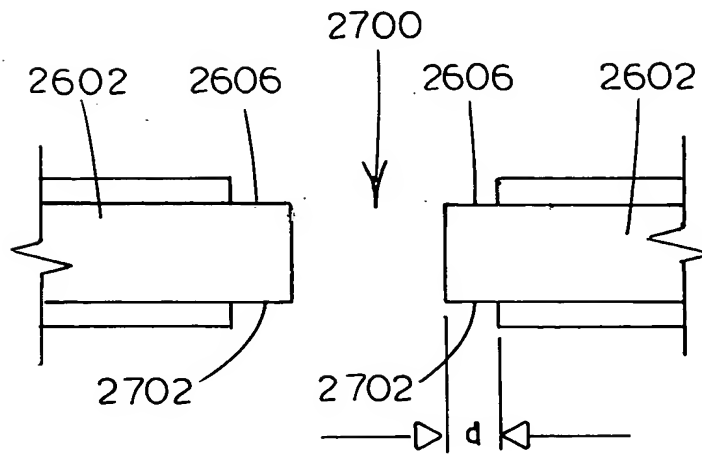


FIG. 27A

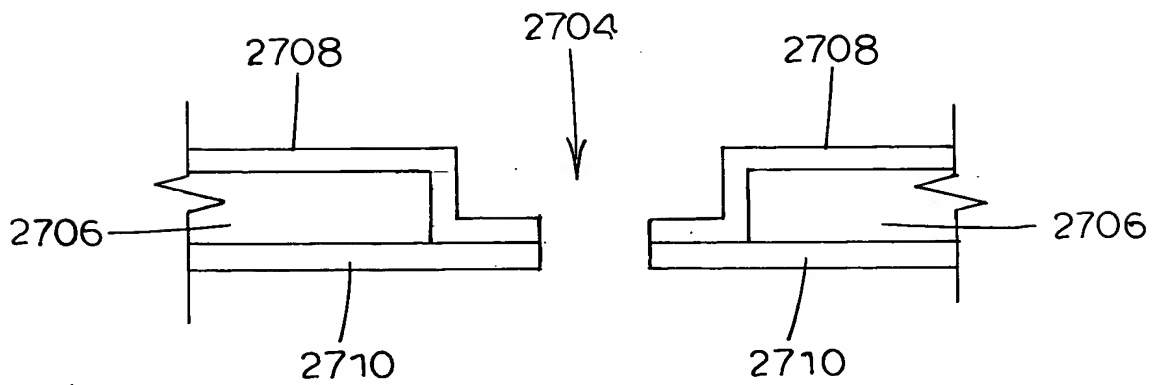


FIG. 27B

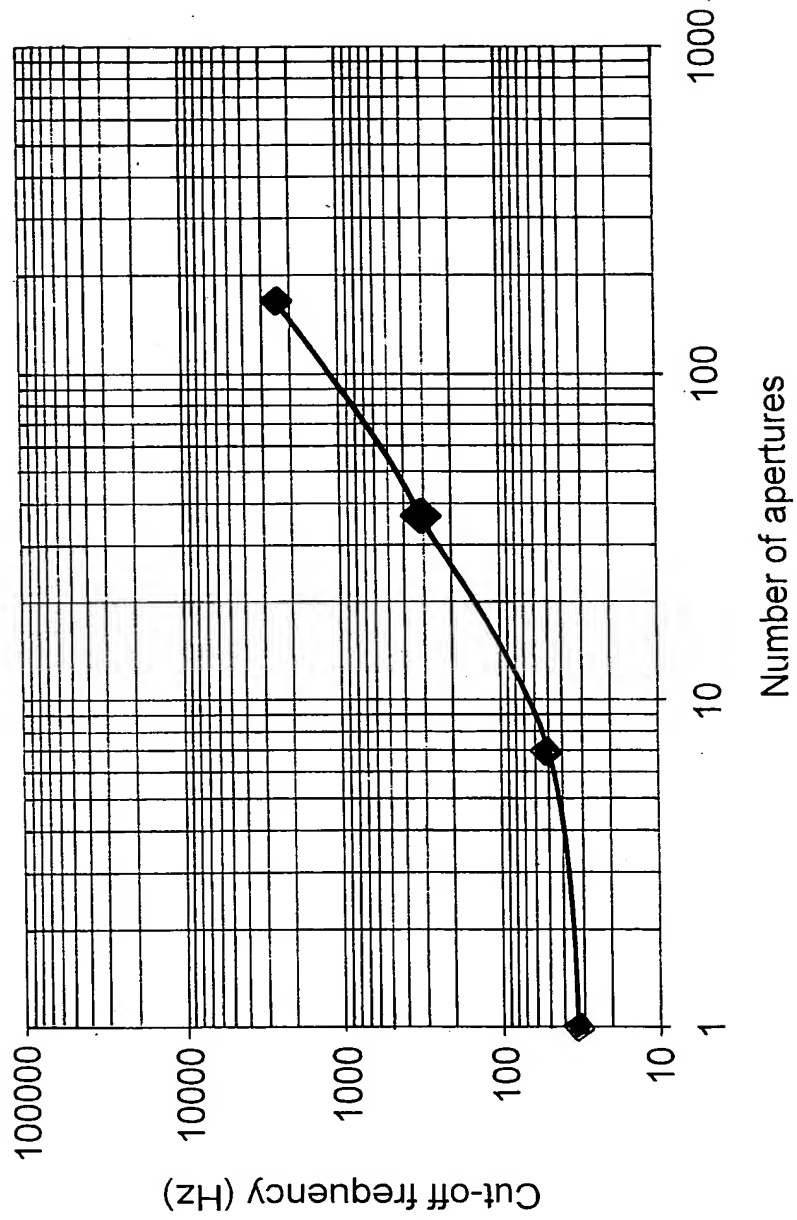


Fig. 28



Damping and spring forces

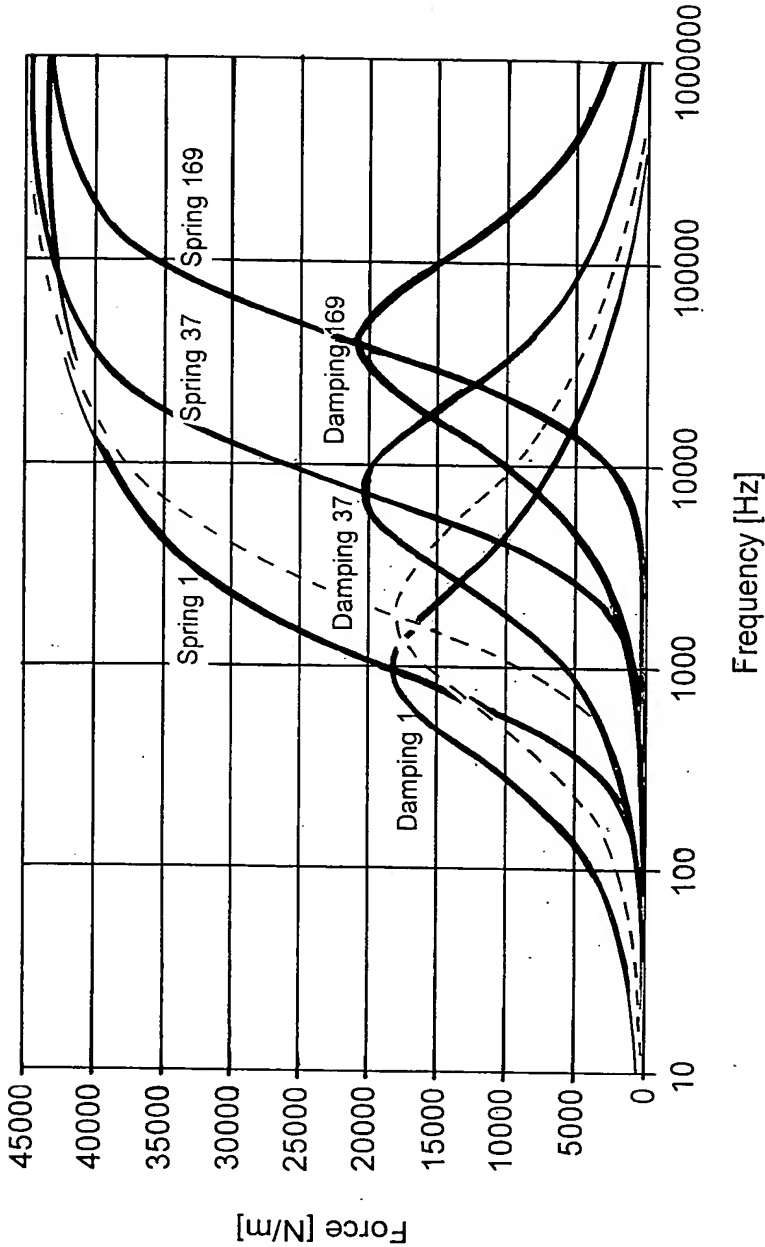


Fig. 29

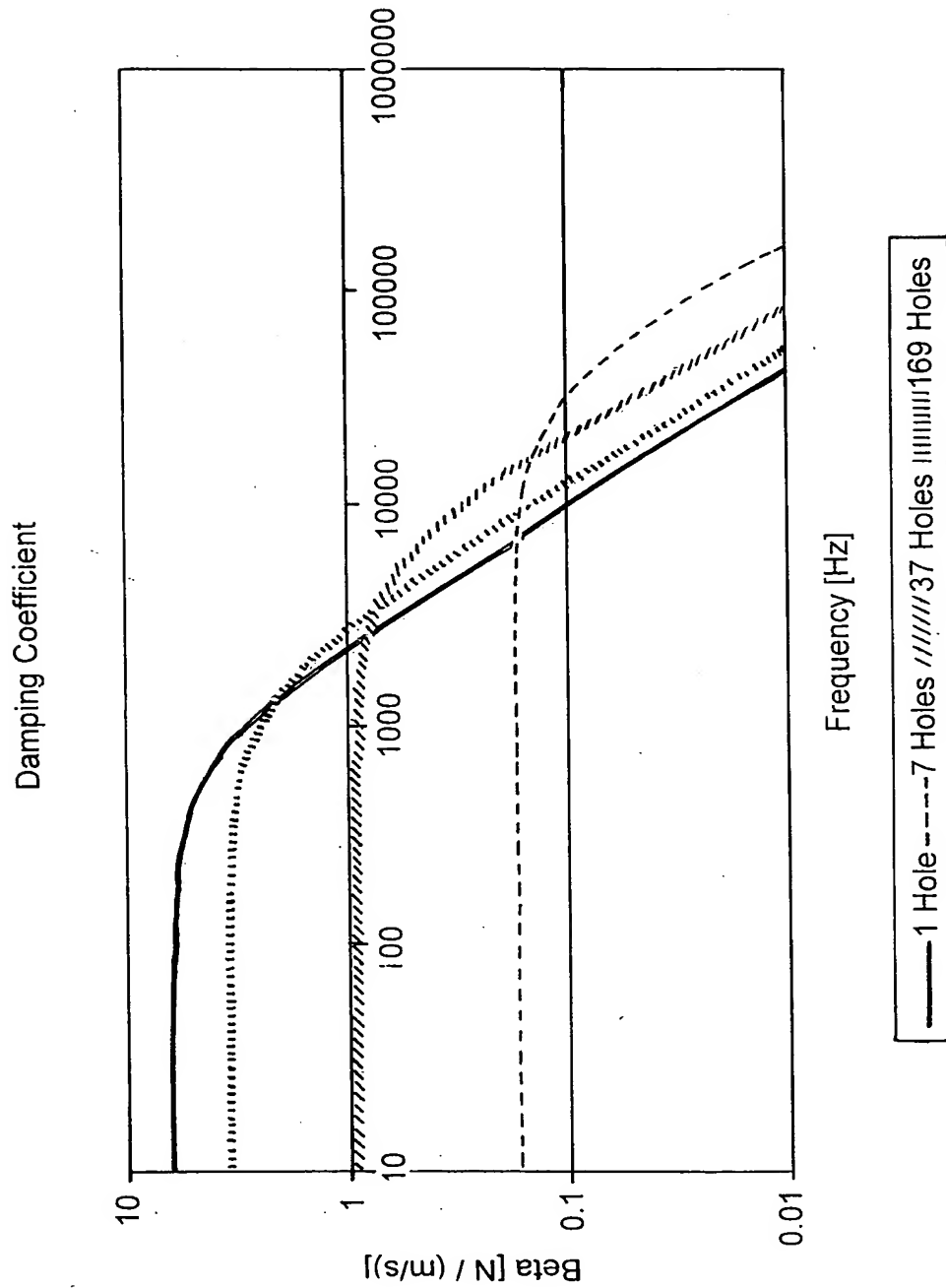


Fig. 30

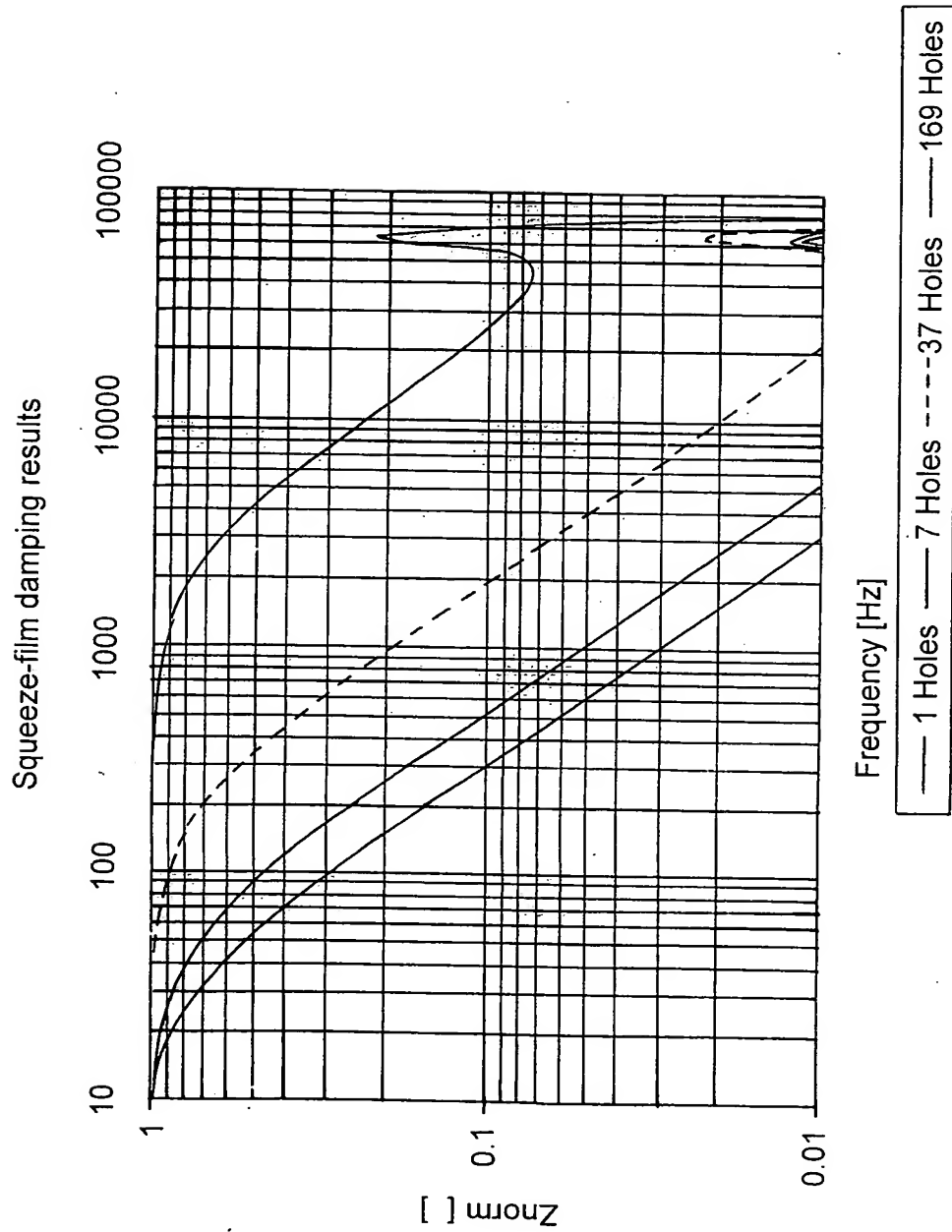


Fig. 31

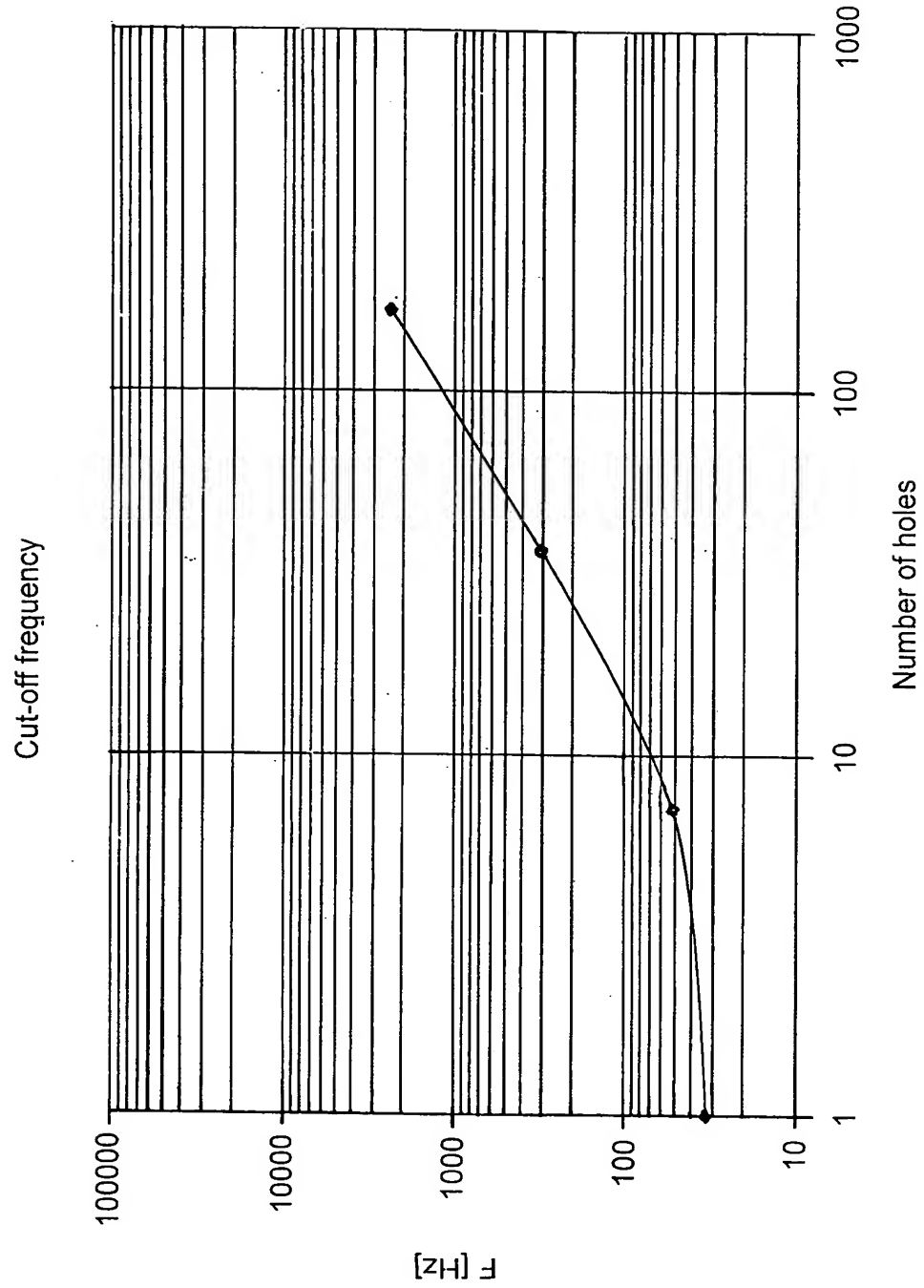


Fig. 32

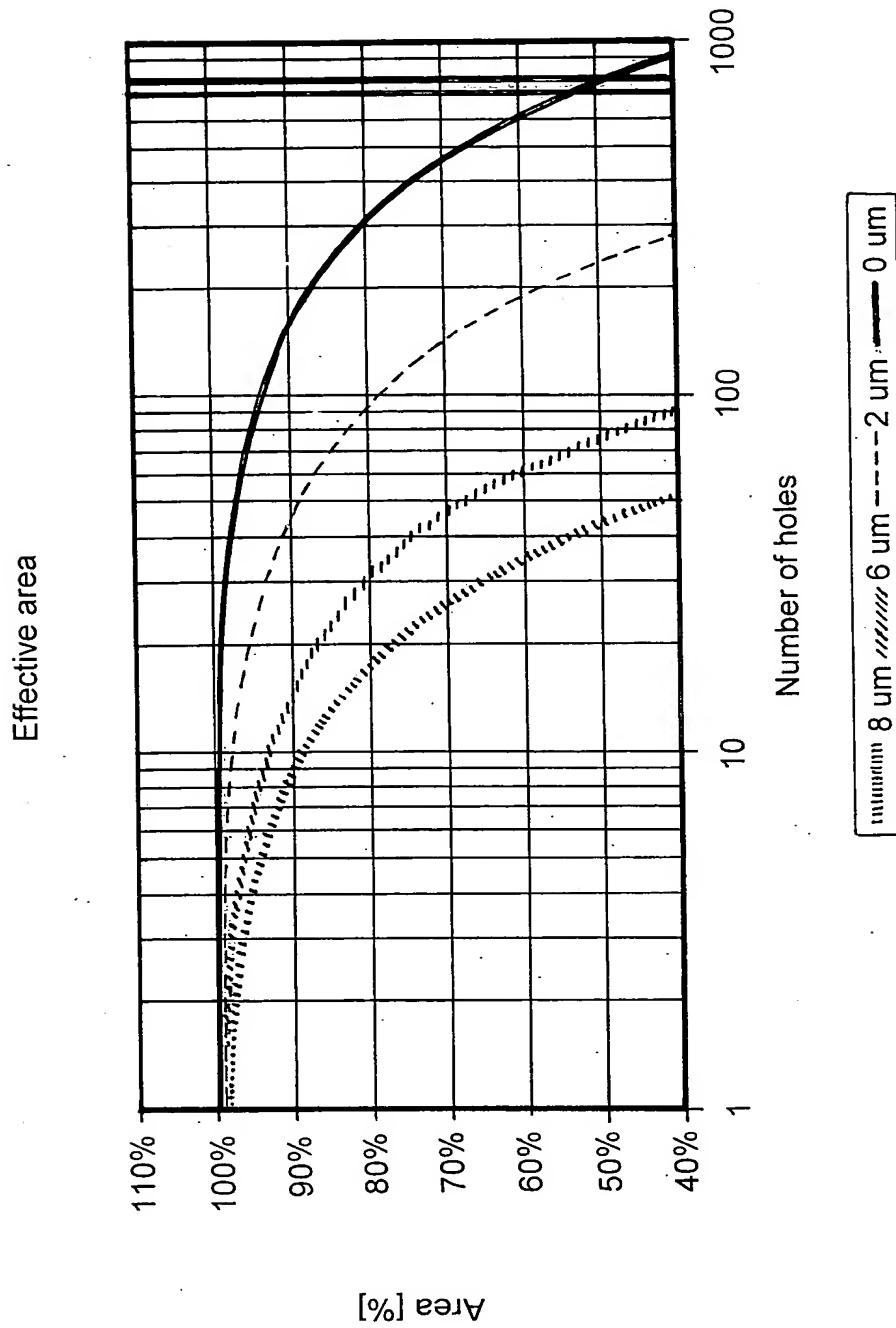


Fig. 33

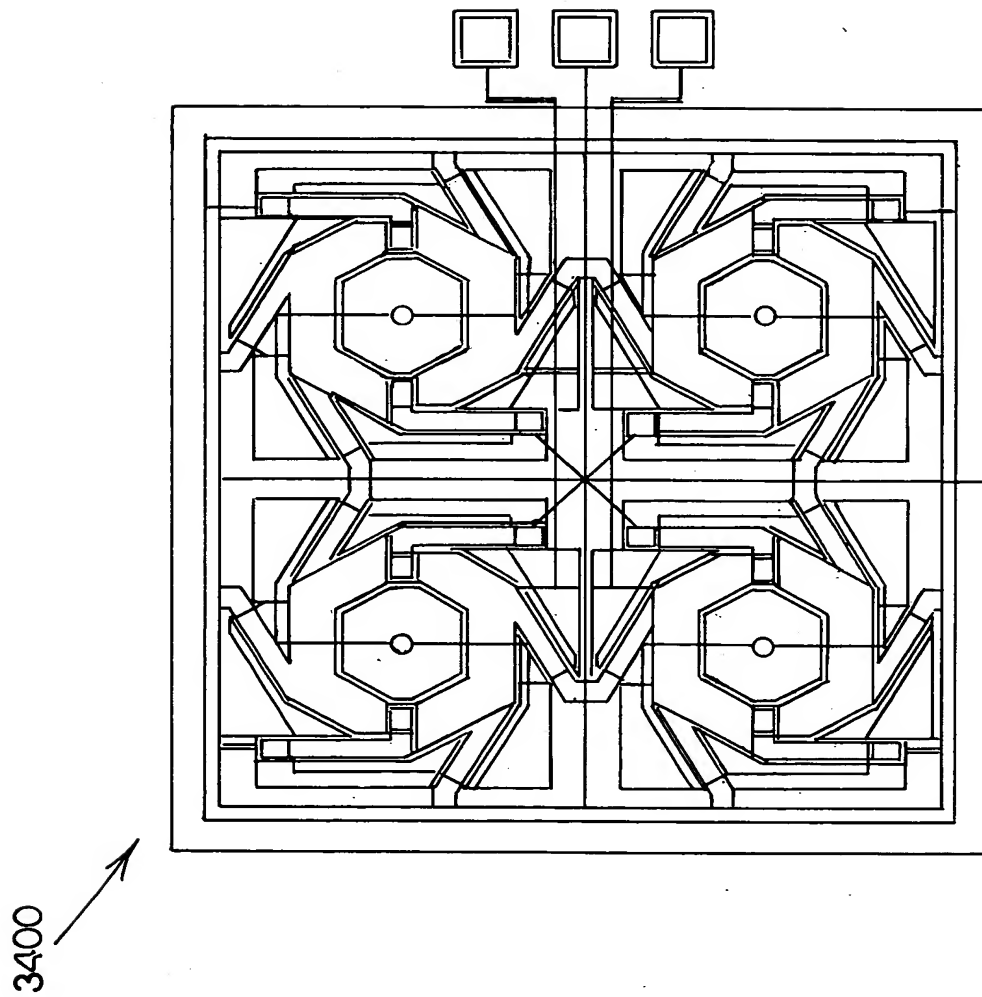


Fig. 34

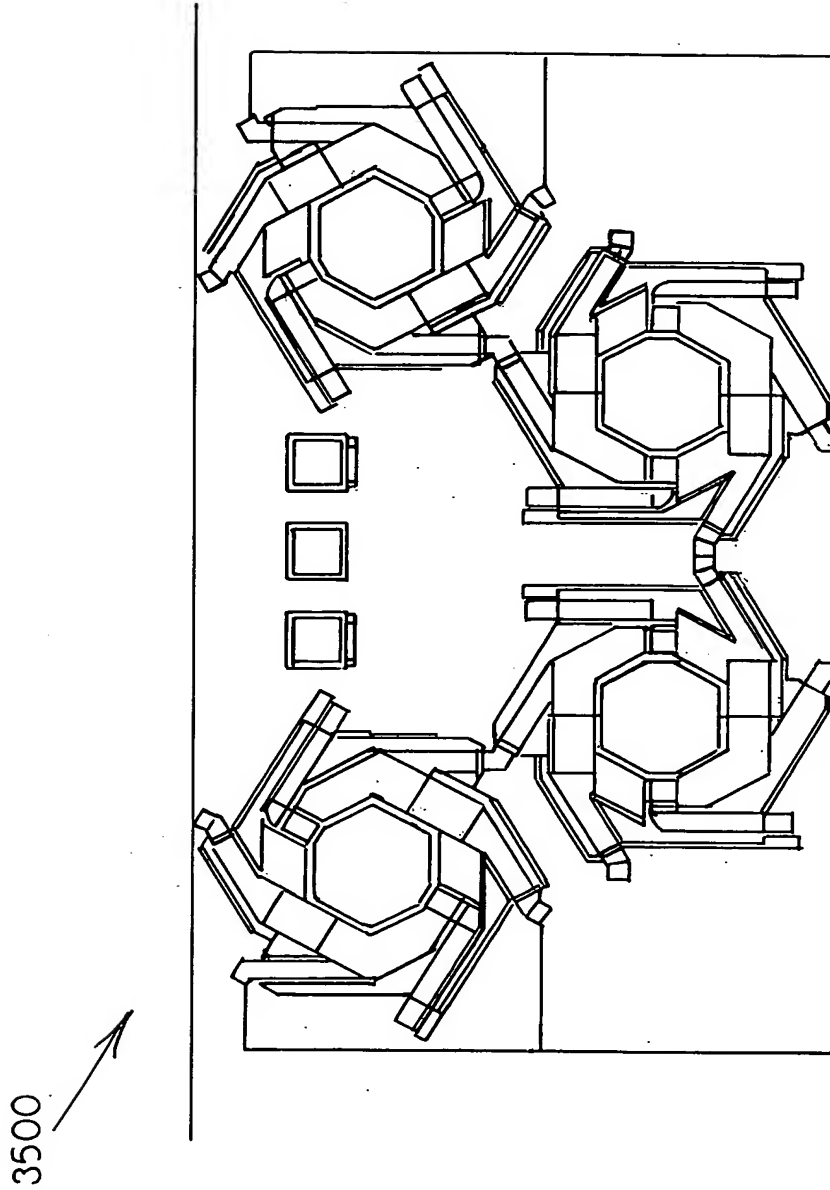


Fig. 35

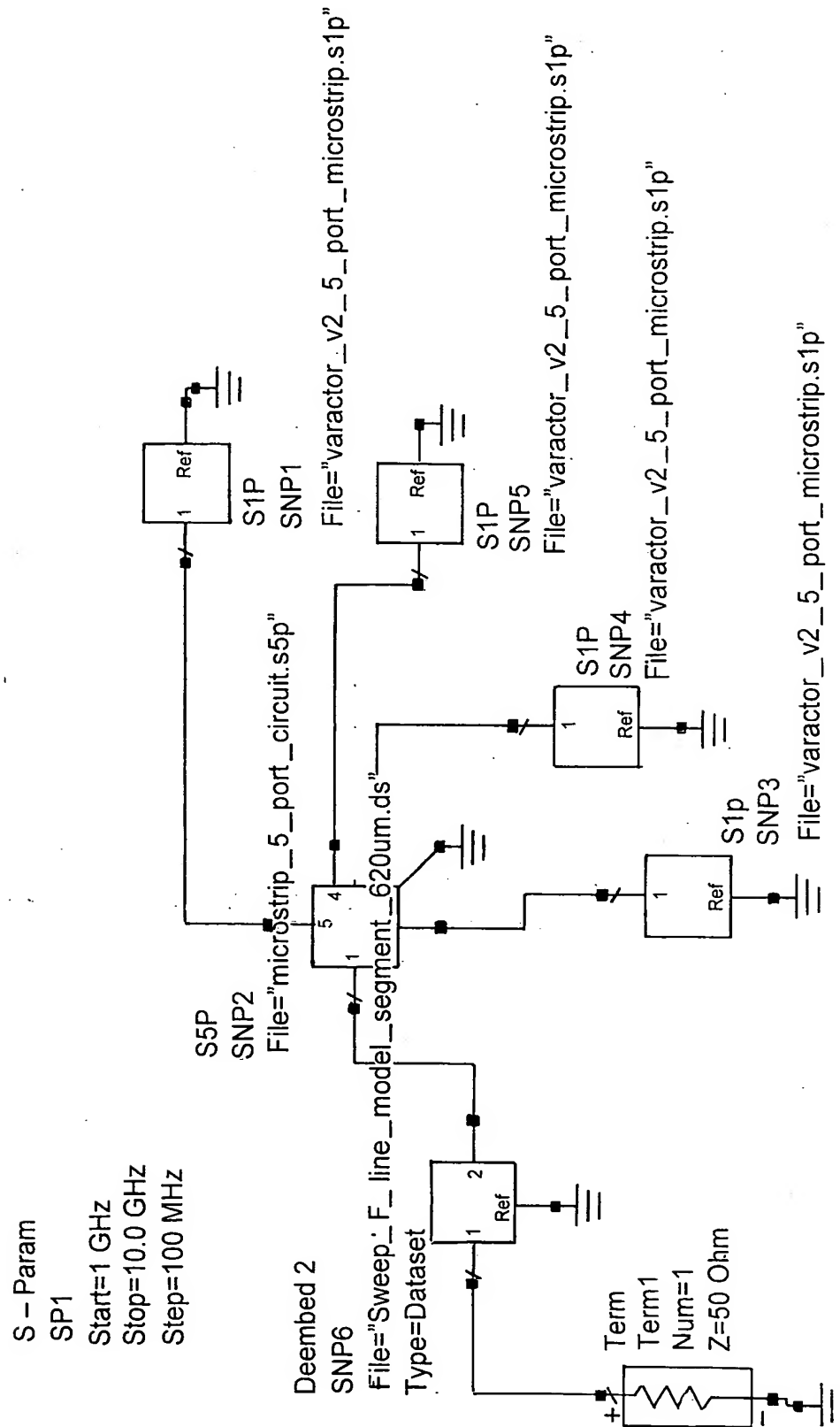


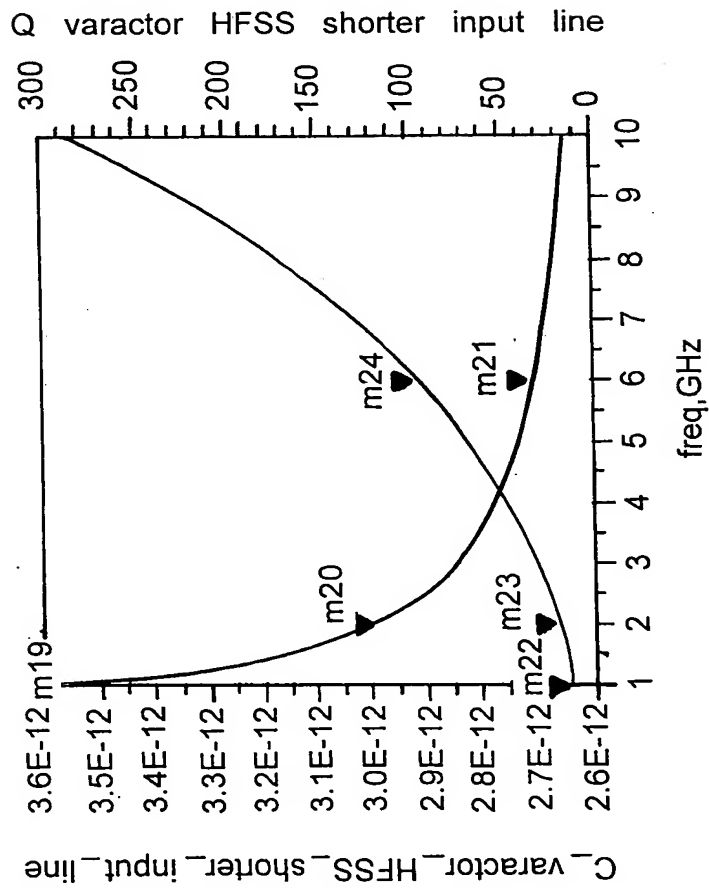
Fig. 36A



Eqn  $Z_{\text{varactor\_HFSS\_shorter\_input\_line}} = \text{stoz}(\text{Test\_quad\_varactor\_shorter\_input\_line}, S11)$

Eqn  $C_{\text{varactor\_HFSS\_shorter\_input\_line}} = \text{im}(\text{Test\_quad\_varactor\_shorter\_input\_line}, Y(1,1)/(2 \cdot \pi \cdot \text{freq}))$

Eqn  $Q_{\text{varactor\_HFSS\_shorter\_input\_line}} = -\text{im}(Z_{\text{varactor\_HFSS\_shorter\_input\_line}}) / \text{re}(Z_{\text{varactor\_HFSS\_shorter\_input\_line}})$



m19
freq=1.000GHz
Q varactor HFSS shorter input line=276.0

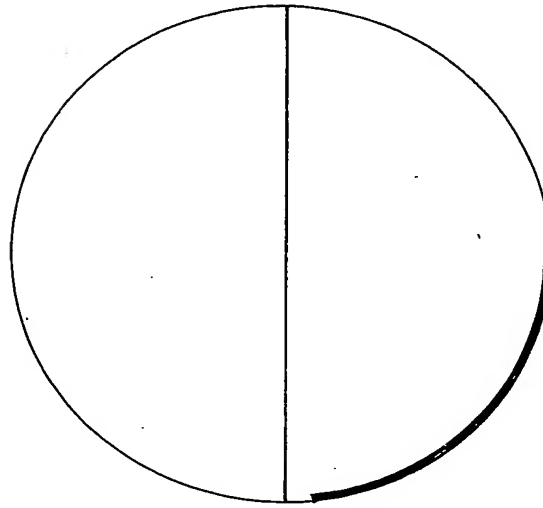
M20
freq=2.000GHz
Q varactor HFSS shorter input line=117.4

m21
freq=6.000GHz
Q varactor HFSS shorter input line=32.0

Fig. 36B

m22 freq=1.000GHz C_varactor_HFSS_shorter_input_line=2.640E-	m23 freq=2.000GHz C_varactor_HFSS_shorter_input_line=2.663E-	m24 freq=6.000GHz C_varactor_HFSS_shorter_input_line=2.914E-
--	--	--

Test\_quad\_varactor\_shorter\_input\_line..S(1,1)



freq (1.000GHz to 10.00GHz)

Fig. 36C

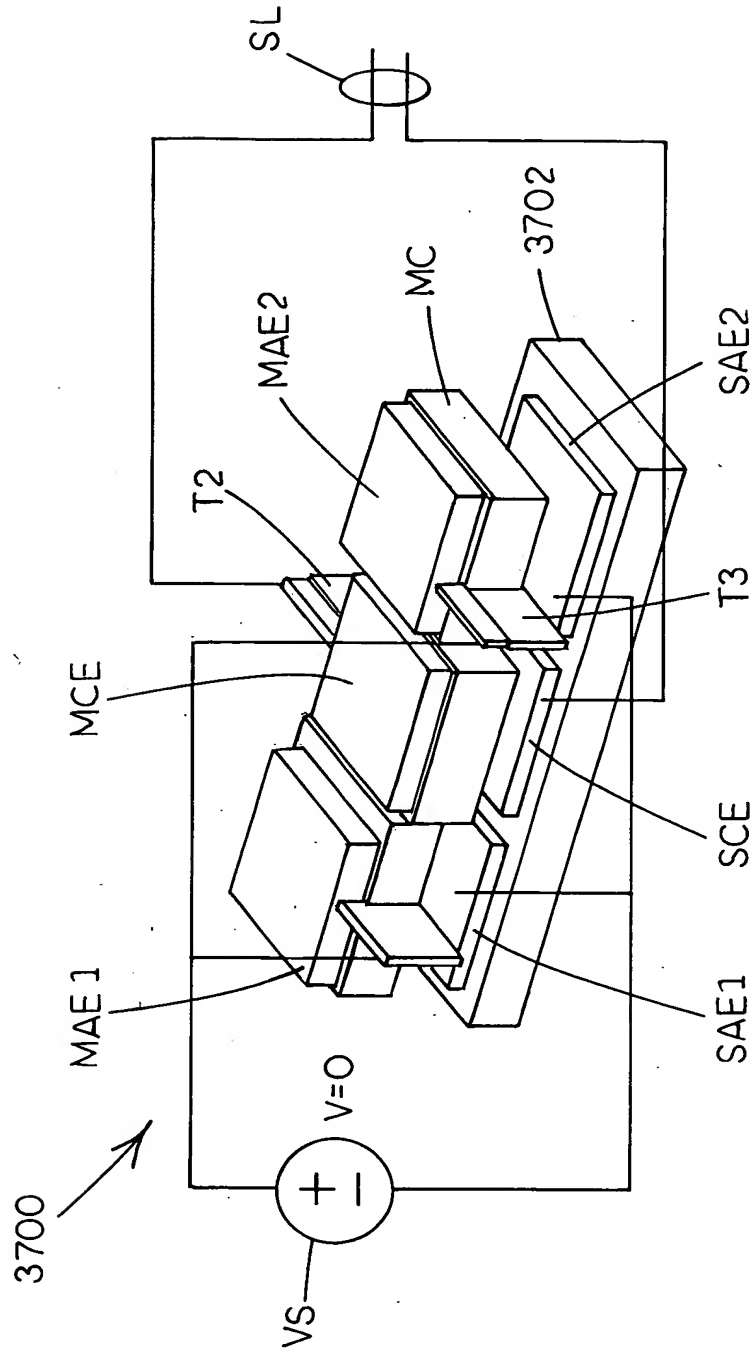


Fig. 37A

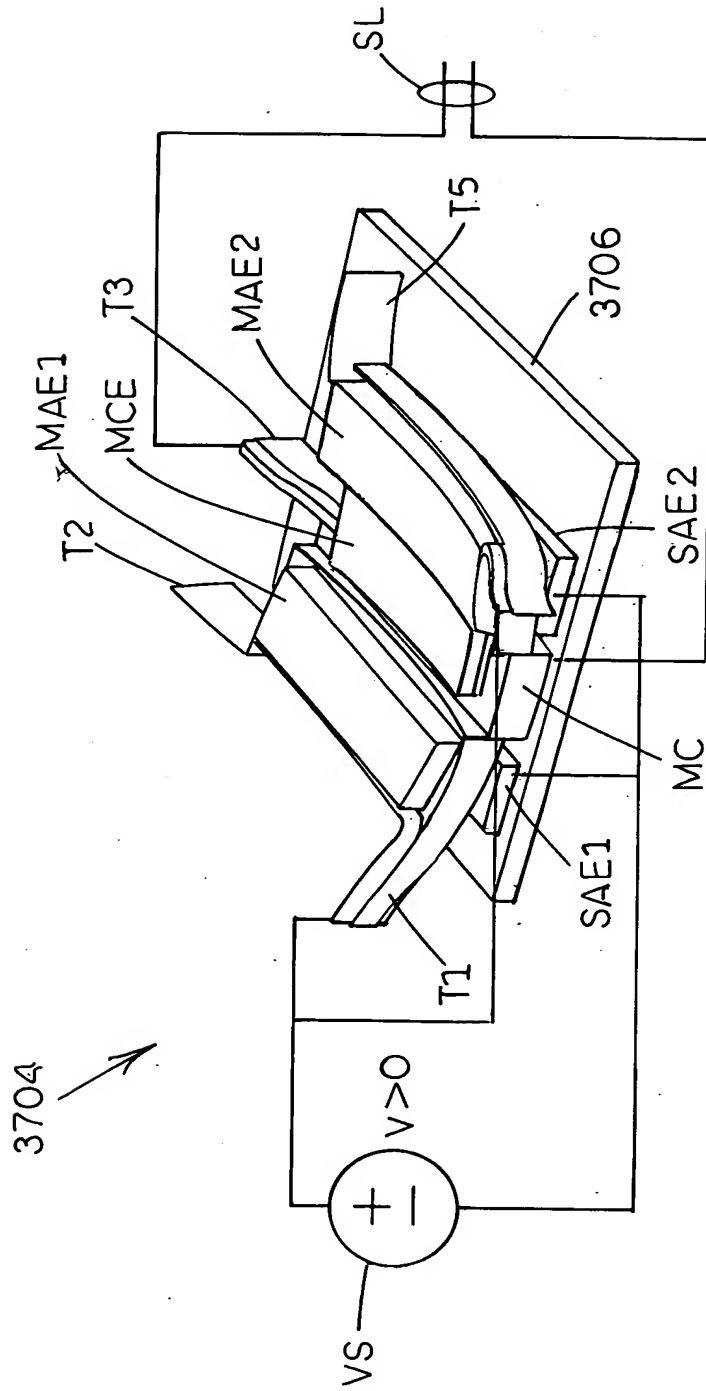


Fig. 37B



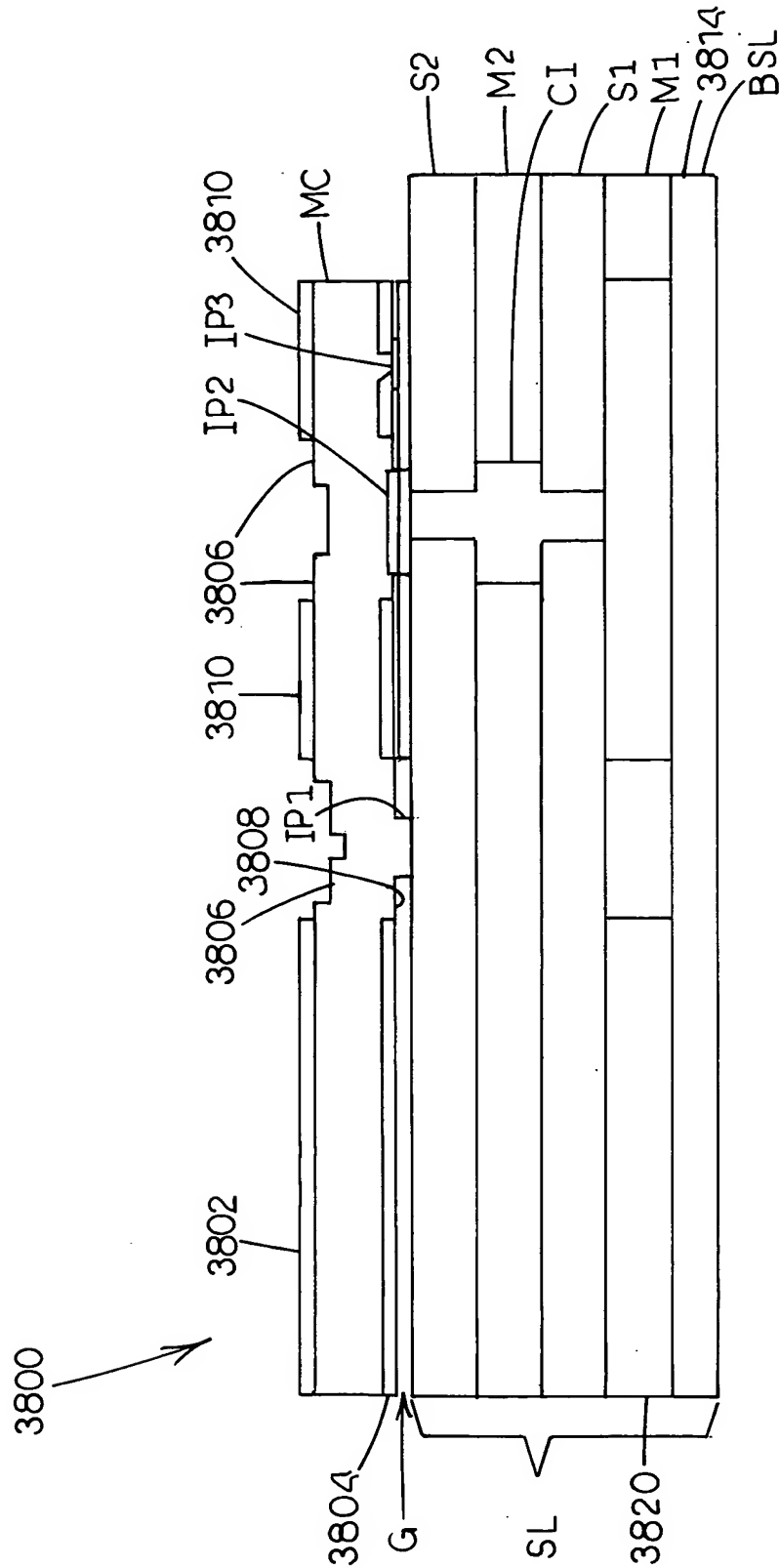


Fig. 39.

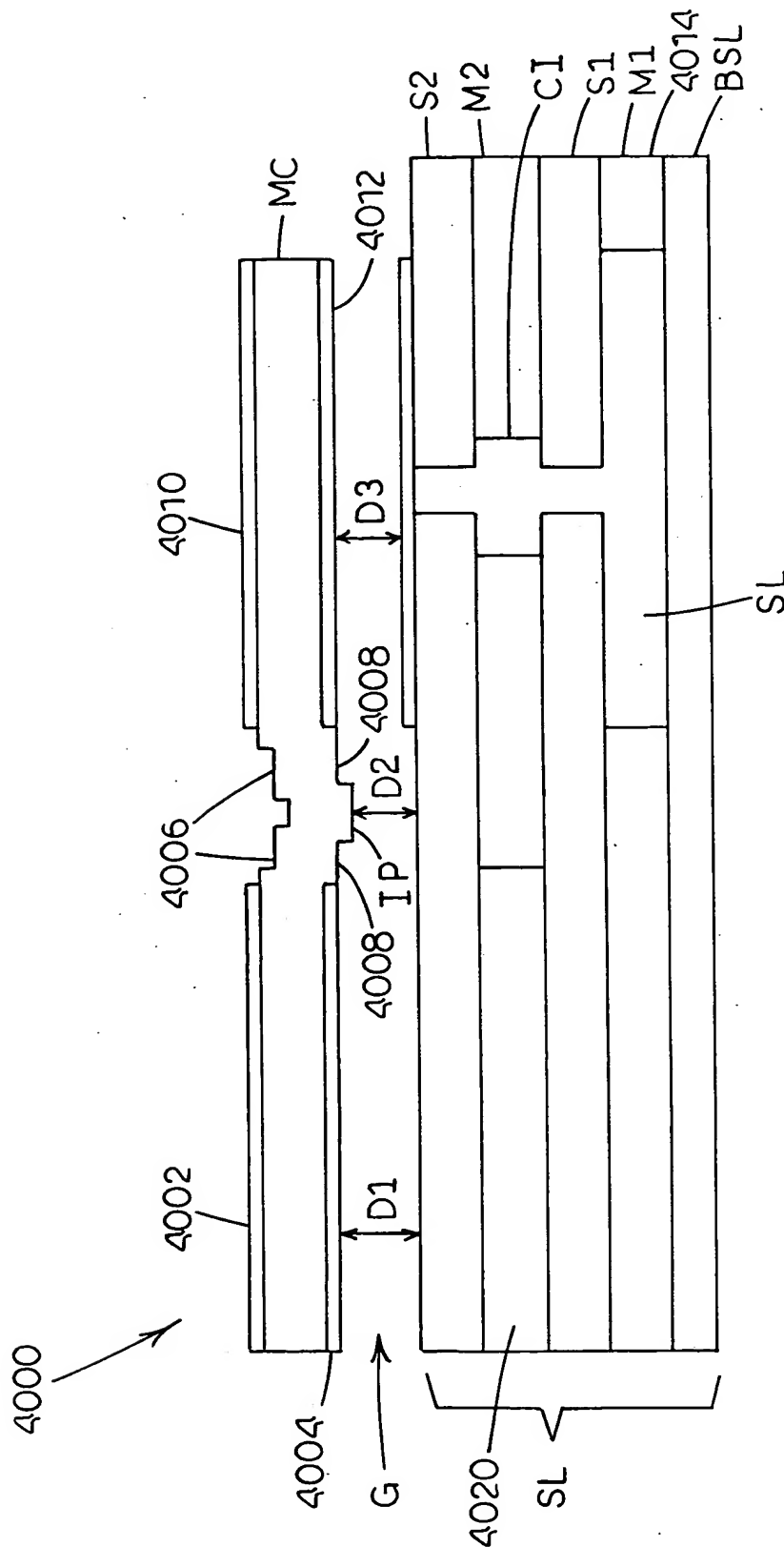


Fig. 40

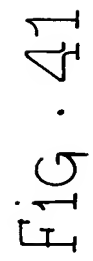


Fig. 41





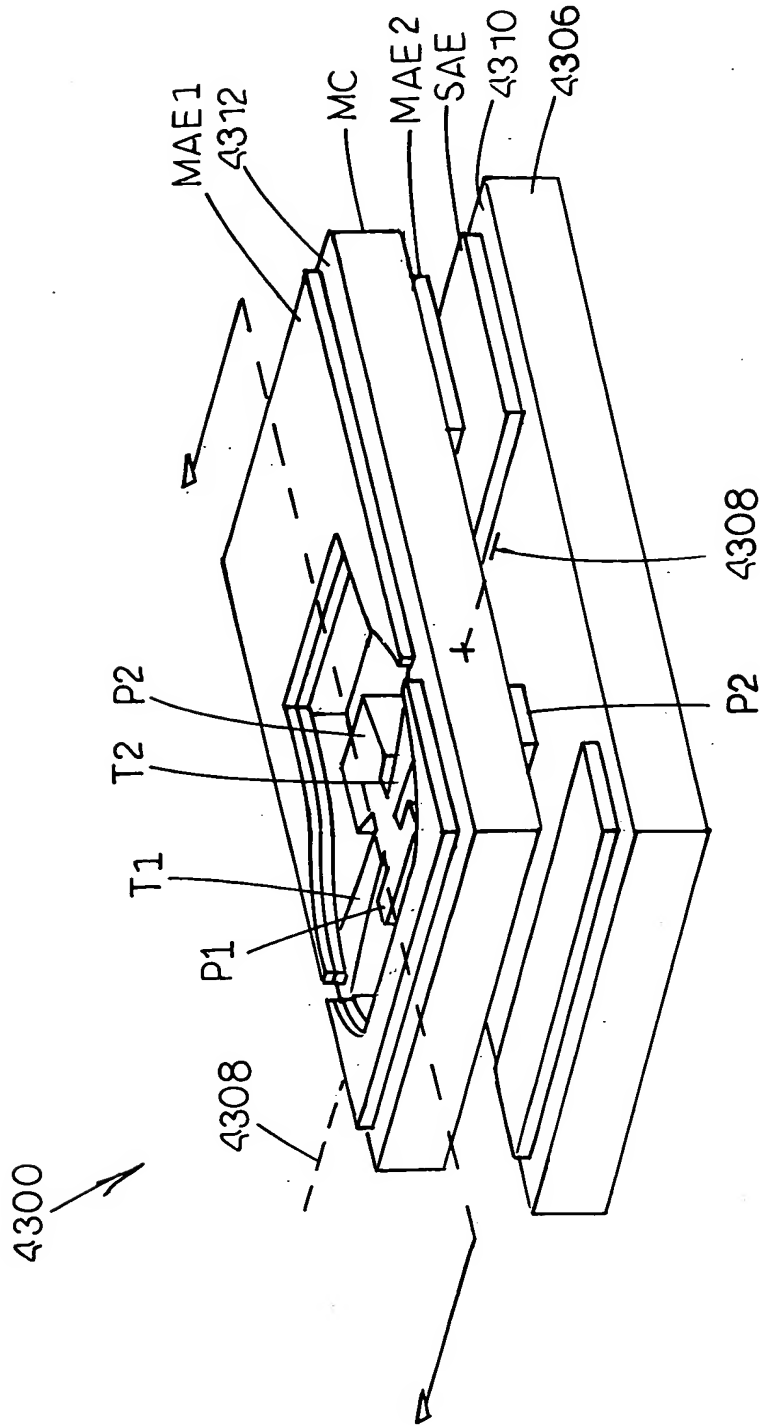


Fig. 43



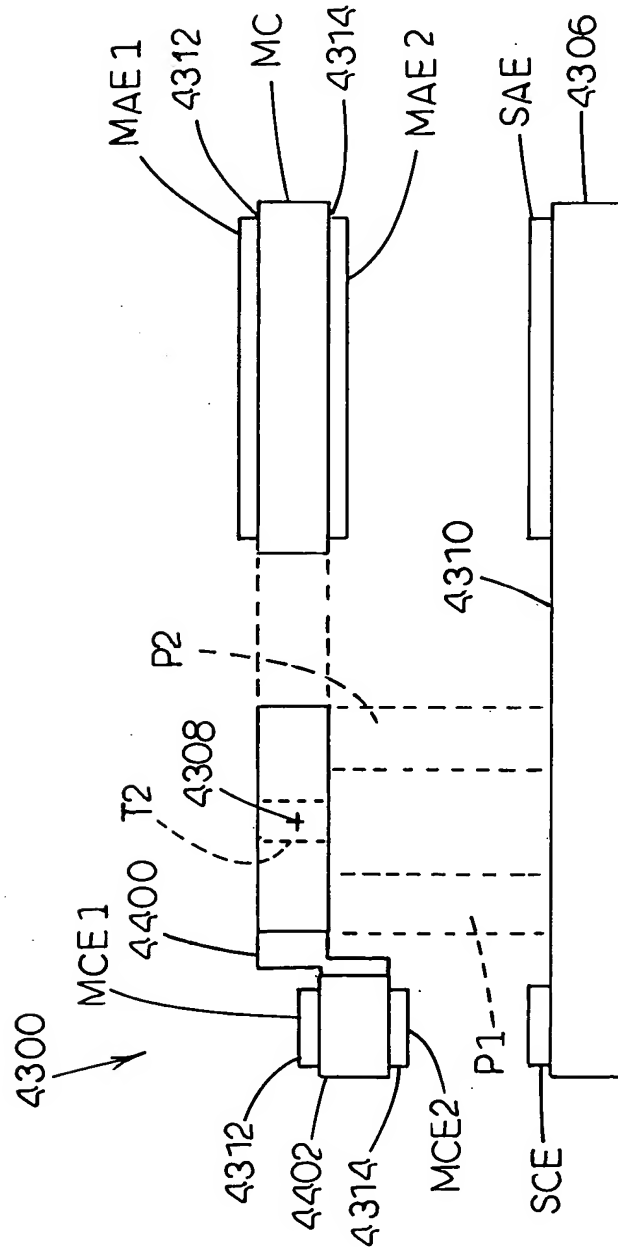


Fig. 44B

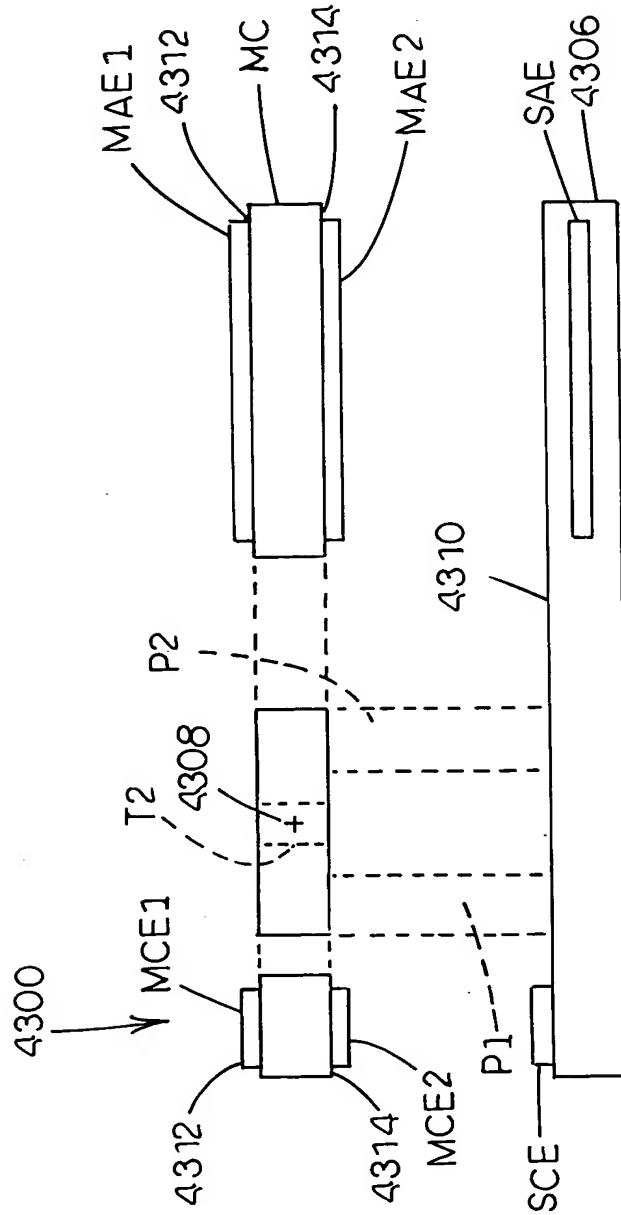


Fig. 44C

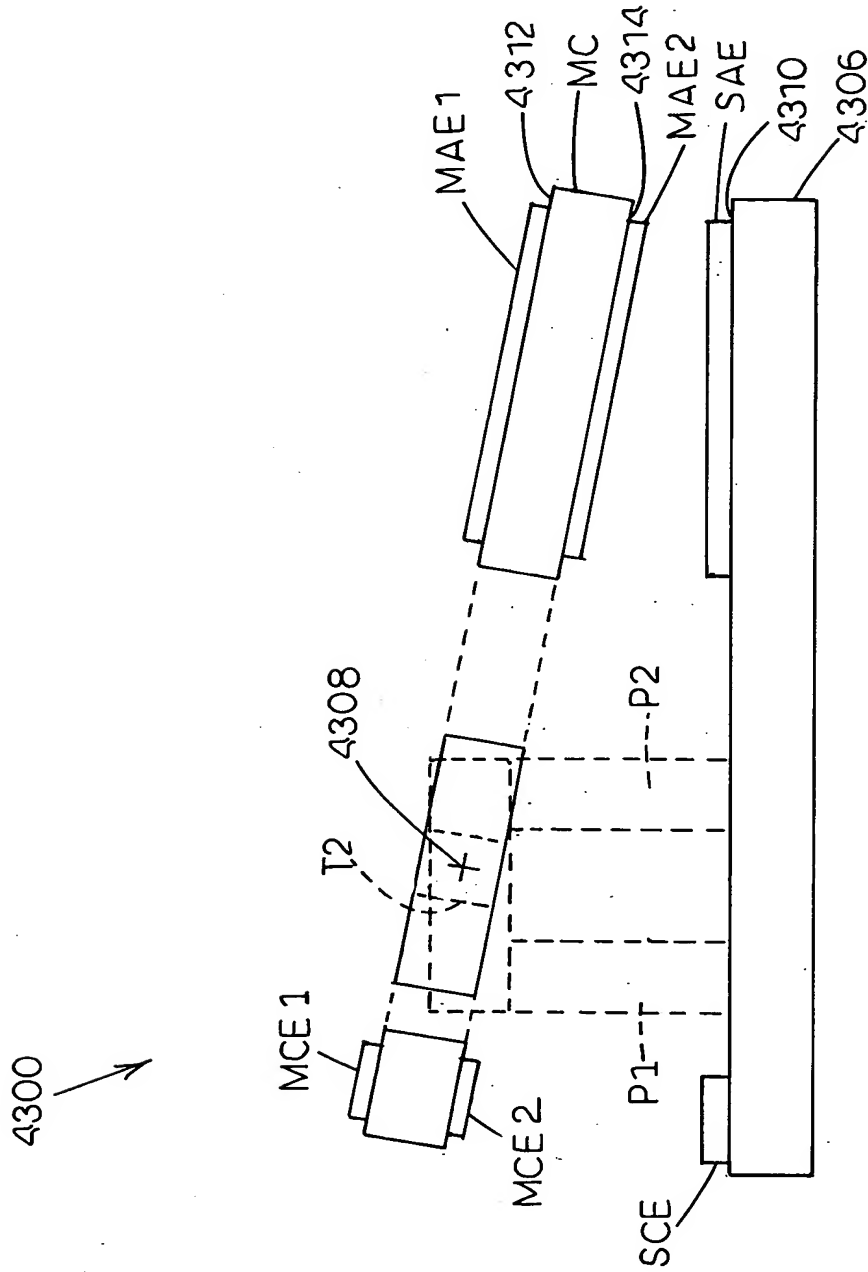


Fig. 45

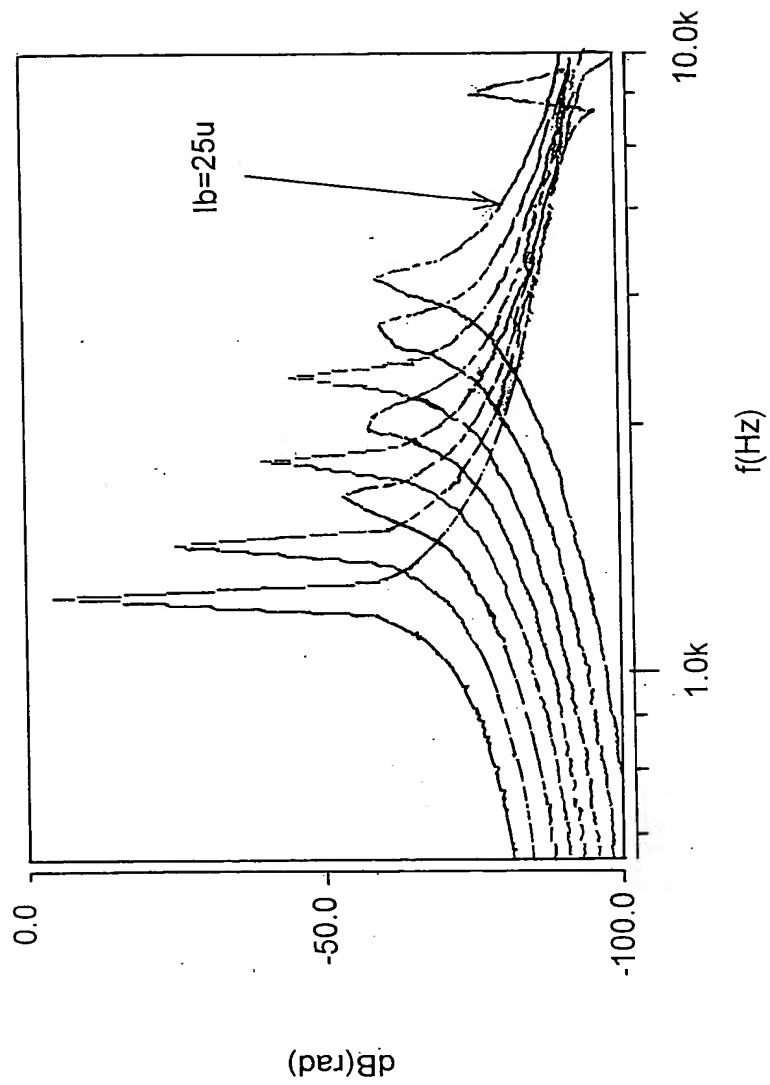


Fig. 46

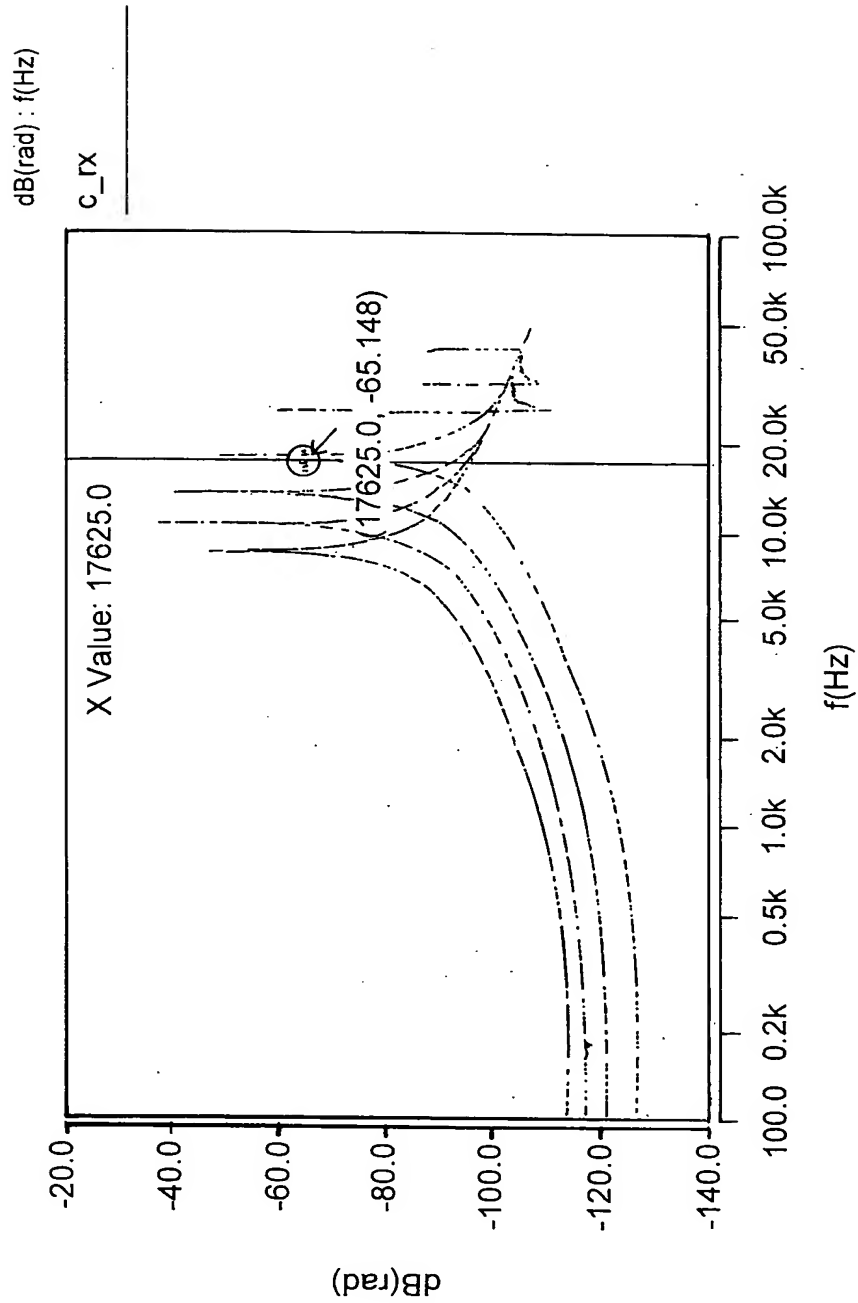


Fig. 47



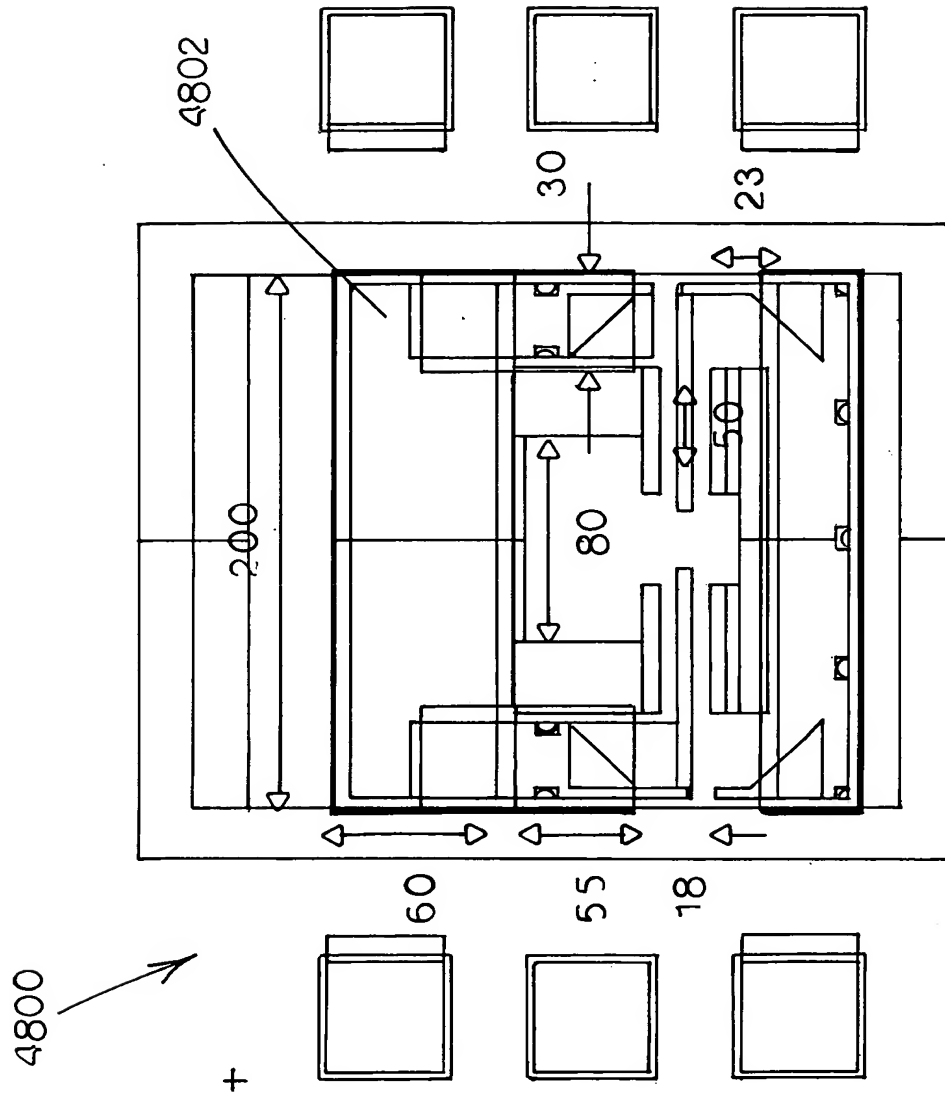


Fig. 48

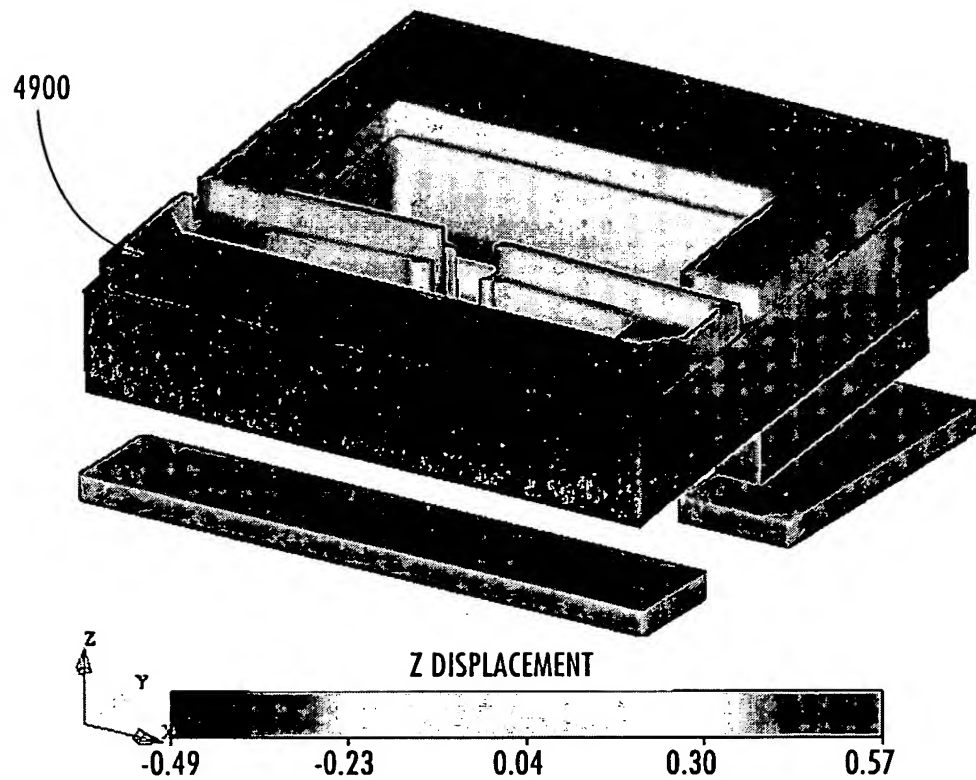


FIG. 49

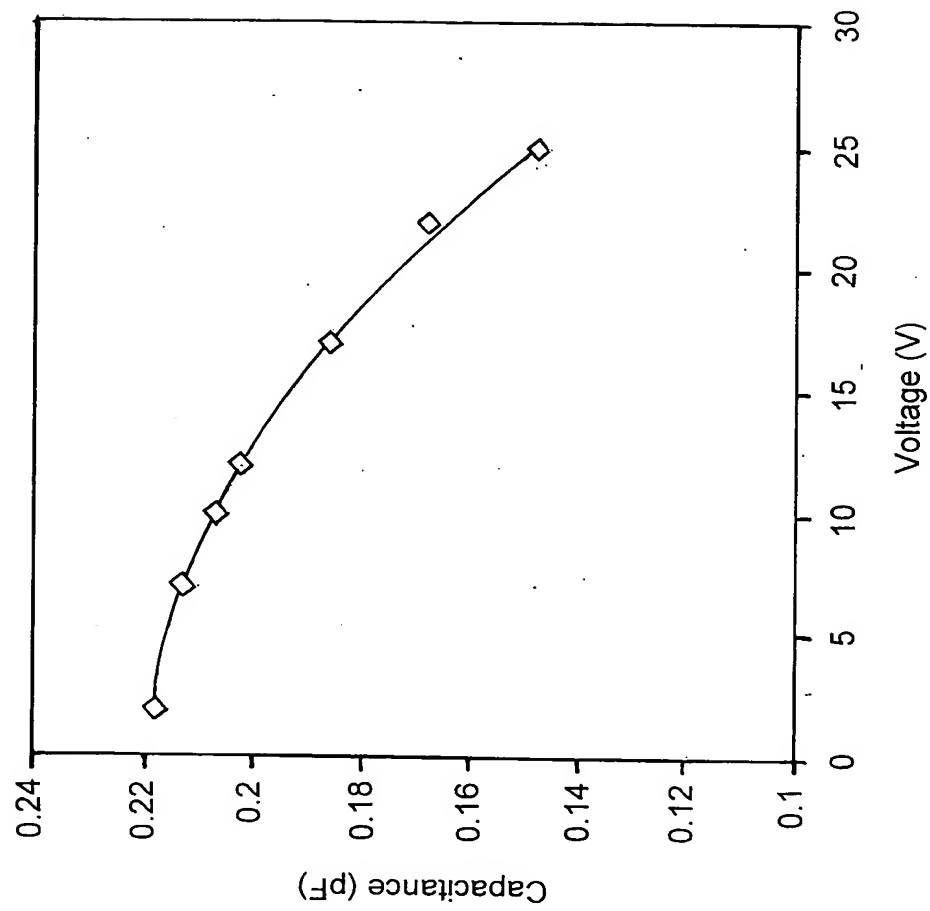
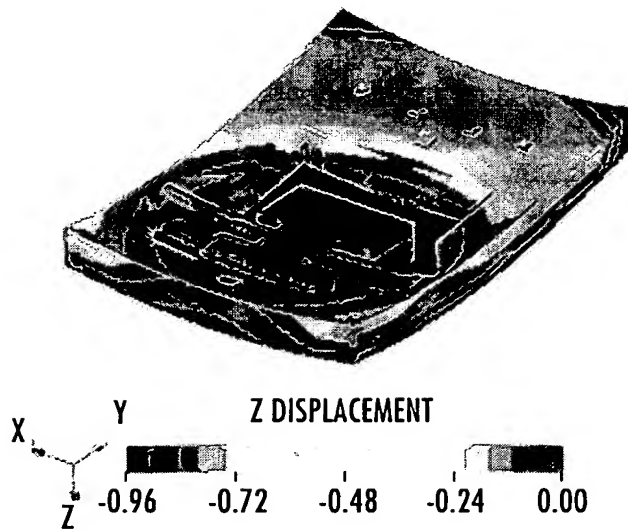
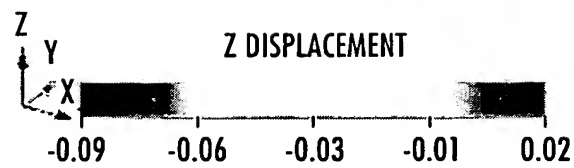
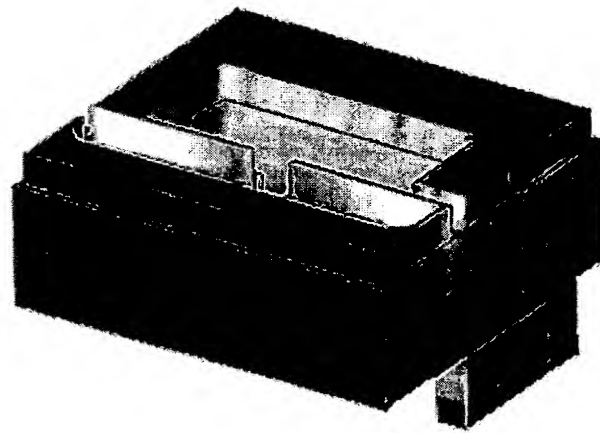


Fig. 50



**FIG. 51**



**FIG. 52**

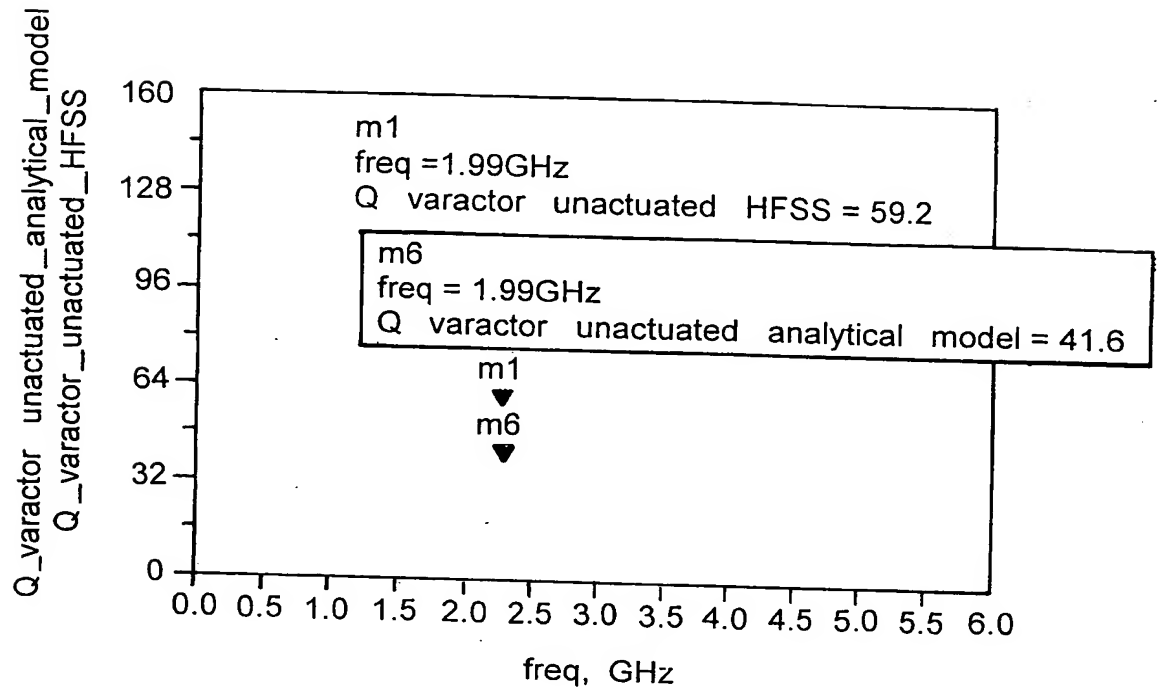


Fig. 53A

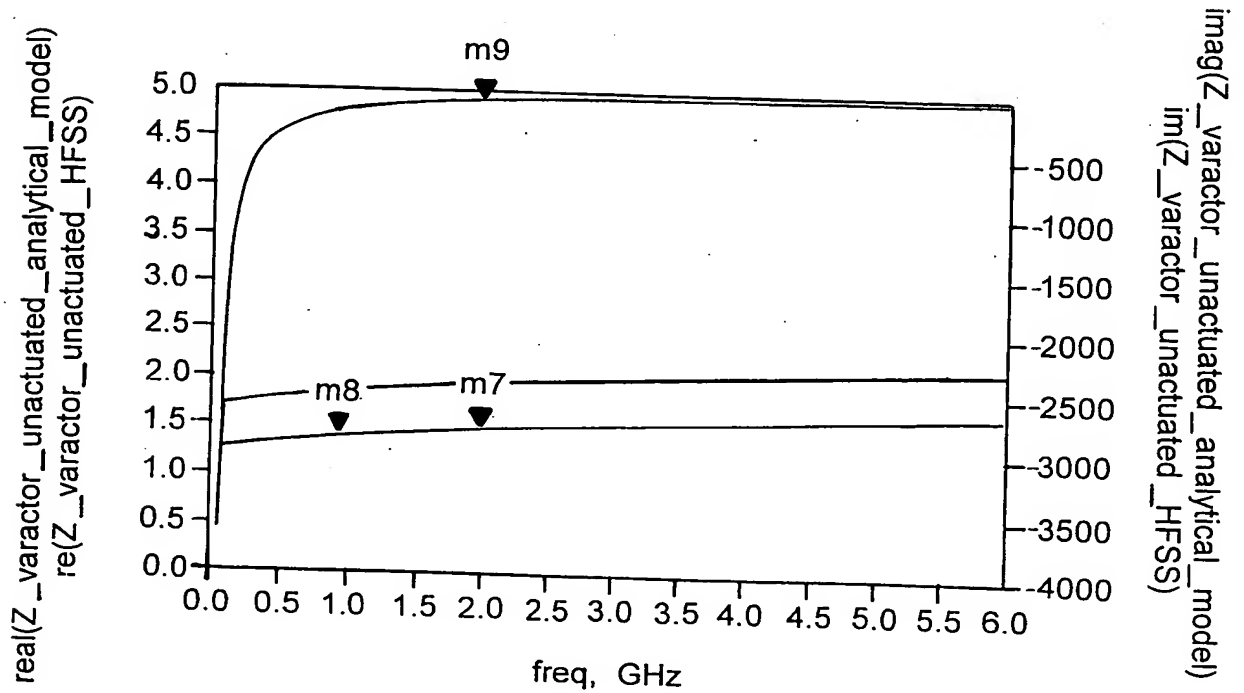
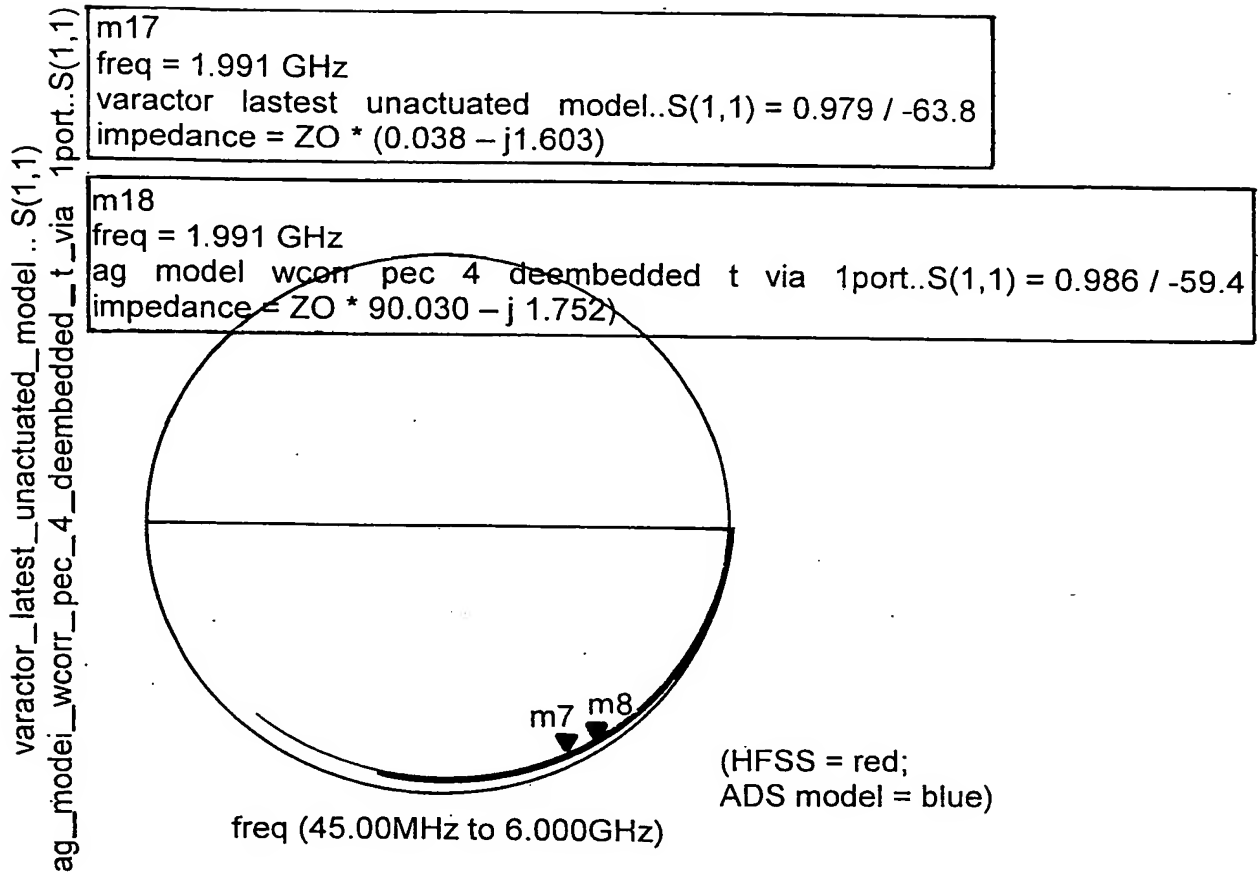


Fig. 53B



m7  
 freq = 1.991 GHz  
 re(Z varactor unactuated HFSS) = 1.47

m8  
 freq = 929.4 MHz  
 re(Z varactor unactuated HFSS) = 1.40

m9  
 freq = 1.991 GHz  
 im(Z varactor unactuated HFSS) = -87.58

Fig. 53c